2024 INSIGHTS REPORT

PART TWO

RESEARCH CENTER FOR FARMING INNOVATION

IOWA SOYBEAN Association

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August 2025 | RCFI 2024 Insights Report | Part 2

On the Cover: A drone image captures soybean harvest in north central Iowa. *Photo by: Joclyn Kuboushek.*

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We advance the long-term competitiveness of Iowa soybean farmers.

ISA MISSION
Driven to deliver opportunities for Iowa soybean farmers to thrive.

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Farmer-led Research, Real Results

For Iowa's farmers, following a game plan for success requires adaptability and resiliency. Iowa Soybean Association's (ISA) Research Center for Farming Innovation (RCFI) is working for Iowa farmers by delivering unbiased, innovative and data-driven programming every day. This research is boots on the ground; it's on our members' farms, and it's the research that farmers are asking for.

In my experience, participating with the team on various research trials has allowed us to learn more about the best products and practices for our acres. Doing so has guided decisions on our farm that increase sustainability, productivity, and most importantly the profitability of our farm.

If you're interested in RCFI's work, I encourage you to participate and learn more. The process is easy, convenient and most importantly — tailored to meet the unique needs of your operation. This team of researchers, agronomists, technicians, analysts and field specialists stand ready to help you make informed decisions on your farm.

Brent Swart, ISA president and farmer near Spencer

Boost Efficiency with Iowa Nitrogen Initiative Trials

BY ALEX SCHAFFER
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Key takeaways:

1. Multi-rate nitrogen trials are a valuable tool to determine economic optimum nitrogen rate.
2. Use Iowa State University's Nitrogen Fertilizer Application Consultation Tool at n-fact.ag/start.
3. To maximize profitability, focus management on 4R principles.

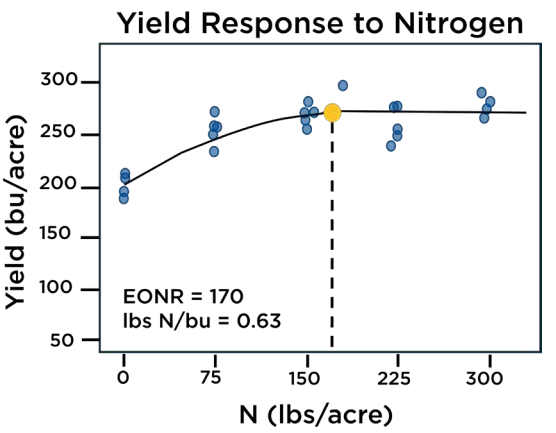
The Iowa Nitrogen Initiative is now in its third year of on-farm trials with the goal of optimizing nitrogen rate recommendations for farmers across Iowa. The project, led by Iowa State University and supported by collaborators including Iowa Soybean Association's (ISA) Research Center for Farming Innovation (RCFI) and others, has logged 627 multi-rate enhanced learning blocks (ELBs) among 184 farmers over the past three years. So far in 2025, ISA added 55 new farmers to the list of participants expanding the reach of the project and helping drive toward the goal of approximately 400 ELBs per year.

Turning data into gains

Farmers participating in this effort support better nitrogen recommendations for farmers across Iowa and receive an end-of-season report that contains the economic optimum nitrogen rate (EONR) specific to their trial and field, yield at the EONR, and nitrogen use efficiency (NUE), a measure of pounds of added nitrogen required to produce a bushel of corn.

These metrics are useful in helping to identify areas where efficiency can be improved on the farm.

For example, if a farmer sees a NUE number of 0.9- or 1.0-pounds nitrogen/bushel, there are likely some areas of management that can be improved to produce more bushels of grain with less added nitrogen fertilizer.



The yellow dot marks the Economic Optimum Nitrogen Rate (EONR) of 170 pounds of nitrogen per acre, where profit and yield are maximized. The blue dots show grain yield in each nitrogen rate within the trial.

A farmer applies liquid nitrogen to his corn field in Hardin County in July.

Weather conditions play the biggest role in determining the EONR, but there are several other things a farmer can do to improve EONR and NUE. One consideration is access to labor and equipment to apply nitrogen at multiple points throughout the growing season, otherwise known as split-application.

Split-application serves two purposes; the first is being able to apply nitrogen fertilizer as close as possible to maximum plant uptake, and the second is the option to adaptively manage your nitrogen fertilizer program. This means adjusting your total nitrogen applied to a field according to the weather conditions of the current growing season.

In general, more rainfall requires more nitrogen due to both higher yield potential and increased nitrogen losses.

N-FACT

The other outcome of this work is a new and improved nitrogen rate recommendation tool to replace ISU's corn nitrogen rate calculator. The new tool is called the Nitrogen Fertilizer Application Consultation Tool, or N-FACT, and can be found at n-fact.ag/start.

This tool models optimum nitrogen rates by considering geographic and management information as well as multi-rate nitrogen trial results from across the state to make individual recommendations to farmers.

My favorite feature of the tool is the ability to input your planned crop scenario well ahead of the growing season to generate a baseline nitrogen plan and run comparisons as the season progresses to understand how your EONR changes. These recommendations can adjust total nitrogen applied based on EONR derived from the tool.

Hybrid nitrogen use efficiency

Farmers are also using these trials to their advantage by classifying their hybrids by nitrogen use efficiency. One farmer participant had a large field planted with multiple hybrids from different seed providers blocked in sections of the field. Trial design placed multiple ELBs into this field by hybrid to better understand if the genetics responded differently to nitrogen fertilization rates. Results found that different hybrids, even when managed the same, can return greatly different nitrogen use efficiency numbers. One hybrid returned NUE of between 0.6 and 0.7 pounds per bushel and the other at 1 pound of nitrogen required to produce a bushel of grain. Not necessarily surprising, but very useful when it comes to understanding hybrid selection and placement across the farm. This information is meaningful to have on the farm given today's commodity market where maximizing efficiency is essential.

Trial opportunities

The Iowa Nitrogen Initiative is a great way to contribute to the sustainability of Iowa's farms by improving nitrogen rate recommendations, increasing efficiency on the farm and reducing nitrogen losses to the environment. Tools based on real on-farm research like Iowa State University's N-FACT will become increasingly important as farms continue to generate data and researchers become better at analyzing the data and making recommendations. This project will continue for years to come, so consider hosting a plot yourself and using the tool as you are contemplating your next nitrogen application.

Contact me to learn more about the Iowa Nitrogen Initiative and this trial opportunity at aschaffer@iasoybeans.com.

Cover Crop Management Strategies

BY EVAN BREHM
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Key takeaways:

1. Determine your operation's goals for using cover crops: erosion control, nitrate management and/or soil health.
2. If new to cover crops and concerned about spring termination, try a winterkill species.
3. Make a management plan, timing and species selection are critical.

Cover crops have increased in the last 15 years from less than 10,000 acres in 2009 to 3.8 million acres in 2024 in Iowa, according to Iowa Nutrient Research and Education Council (INREC) survey data.

State and federal government programs have been the main driver for cover crop adoption. These various programs help to mitigate the risk of a financial burden when planting cover crops.

Studies show that cover crops provide in-field and environmental benefits such as soil and nutrient retention and by suppressing early-season weeds.

Between cost-share and added land value opportunities, farmers and landowners must then decide which species of cover crop(s) to plant. Goals for the acres should narrow the options of species. Here are four questions to guide your decision making:

What am I focused on accomplishing with cover crops?

Erosion control: According to Sustainable Agriculture Research and Education (SARE), cover crops can reduce soil erosion from 31-100%. This range depends on species, planting time and timing of termination. Cereal rye continues to reign as the king species in Iowa accounting for 90% of all cover crop planted acres.

Nitrate management: Cover crops reduce nitrate loss by an average of 22% according to Iowa Soybean Association's (ISA) tile water sampling.

Soil health: Biodiversity brings value by stimulating different soil microbes to enhance fungi like mycorrhizae that increases soil carbon, improves soil organic matter and nutrient availability.

Do I want a winter hardy or winterkill species?

Winterkill species are planted similarly to winter-hardy species but will naturally terminate with winter conditions. If a farmer is new to cover crops, winterkill species reduce the worry of being in the field next spring. Some winterkill species include oats, radishes, turnips and peas.

Winter-hardy cover crops survive the harsh Iowa winters and green up in the spring prior to planting. With a longer growing time, winter-hardy covers bring greater value in erosion control, nitrate scavenging and soil health management, but come with additional risks to manage through termination. Some winter-hardy species include cereal rye, wheat, barley, winter camelina and hairy vetch.

Figure 1. Red Barn Solutions' Harvest Seeder, a combine-attached air seeder.

Photo credit: Evan Brehm

What equipment is available?

Grain drills have been the go-to in recent years for seeding cover crops. This is due to superior seed-to-soil contact, which is important for germination and early growth. The challenge is time; fall-seeded cover crops are planted typically when harvest is underway. The row crop must be harvested first to accommodate the grain drill.

Drones, airplanes, fertilizer floaters and air seeders provide broadcast seeding opportunities. These methods provide greater timing flexibility and allow for earlier establishment of cover crops in the late summer or early fall. Many companies with drones are applying thousands of acres of cover crops in Iowa.

Local cooperatives can mix in cover crop seed with dry fertilizer applications. Air seeders mounted to combines have hit the market where cover crops are applied low to the ground while a row crop is being harvested, such as the Harvest Seeder from Red Barn Solutions (see Figure 1).

What should I do next?

Combine your answers and thoughts from the previous questions to determine your next steps. To assist in this process, below are some cover crop recommendations and Natural Resource Conservation Services (NRCS) planting guidelines. Some of these rates are higher than NRCS requirements, which increases the long-term benefits.

Want to learn more about cover crop management or species selection? Seek out an area farmer who has adopted these practices or reach out to me at ebrehm@iasoybeans.com.

Cover Crop	Benefits
Straight Grass (ahead of corn or soybeans) • cereal rye 60 lbs. • or oats 70 lbs.	Fibrous roots scavenge excess nitrates and fight soil erosion. Cereal rye is winter hardy, requiring spring termination. Oats will winterkill. Great option for first time cover cropping.
Soil Nitrogen Fixer (ahead of corn) • cereal rye 45 lbs. • radish 1-2 lbs. • hairy vetch 10 lbs OR red clover 10-15 lbs.	Cereal rye is winter hardy, requiring spring termination. Vetch and clover have low carbon: nitrogen (C:N) ratios and fix organic nitrogen (N) with inoculated seed. Radish's tuberous roots break through compaction layers, helping infiltrate water and scavenge deep nutrients.
Aerial Applied Soil Saver (apply in standing row crops) • cereal rye 60 lbs. • radish 2 lbs. • rapeseed 2 lbs.	For increased soil health benefits, increasing the rate of cereal rye while keeping radish and rapeseed at standard rates helps break through compaction layers and performs well in dry conditions. Cereal rye is winter hardy, requiring spring termination. The others will winterkill. Increased seeding rates if applying aerially. Great option for aerial application with a drone or airplane. This mix has larger seeds to penetrate leaf canopy. Earlier application allows increased biomass and maximizes cover crop potential.

Extending the Lifespan of Edge-of-Field Practices

BY ALEX BUSEMAN
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Key takeaways:

1. Edge-of-field practices are vital for conservation.
2. Site-specific actions extend lifespan.
3. Ongoing monitoring and support are crucial.

Edge-of-field (EOF) practices are becoming increasingly common in Iowa's agricultural landscapes. Installed for a variety of conservation benefits, including improved water quality, habitat enhancement and flood mitigation, these practices play a critical role in sustainable land management.

One of the most frequently asked questions about EOF practices is: "How long do they last?" The most common answer? "It depends." While the exact lifespan of each practice can be difficult to predict, there are many steps land managers can take to help maximize their use.

Woodchip bioreactors

Woodchip bioreactors can remain effective for 10 years or more with proper site management. To maximize the bioreactors longevity, you can:

- Minimize traffic over the woodchip-filled chamber to reduce compaction risks
- Convert any surface tile intakes upstream of the bioreactor into blind inlets to reduce sedimentation
- Seasonally adjust stoplogs in the control structures to maximize saturated conditions and limit woodchip degradation
- Secure control structure lids and install rodent gates on tile outlets.


Bioreactor


Buffer


Oxbow

Saturated buffers

Saturated buffers can last more than 20 years with proper site maintenance. Because the vegetated buffer is where denitrification occurs, maintaining healthy vegetation is essential. Strategies to ensure long-term performance include:

- Controlling any woody or invasive plant species that will out-compete native grasses and obstruct tile flow
- Converting any surface tile intakes upstream of the saturated buffer into blind inlets to reduce sedimentation
- Securing control structure lids and installing rodent gates on tile outlets.

Oxbows

With careful land management, a restored oxbow can last decades or centuries. Since an oxbow restoration involves excavating sediment that was deposited in the oxbow scar over time, the key to extending an oxbow's longevity is to minimize sediment sources into the oxbow. To minimize sediment influx, you can:

- Establish and maintain native vegetation along the banks and upland area surrounding the oxbow
- Convert any surface tile intakes upstream of the oxbow into blind inlets to reduce sedimentation
- Stabilize the banks and connection channel to minimize erosion.

Iowa has more than 500 EOF practices that remove hundreds of thousands of pounds of nitrate and promote wildlife populations every year. It is important to maintain these practices to continue addressing each farmer's goals.

If you're seeing sediment buildup in your EOF practice, consider using a sewer jet to flush accumulated material from tile systems. For vegetative cover, pollinator seed mixes are widely available and excellent options for seeding oxbows and saturated buffers. Flagging any control structures to avoid collisions with equipment is also good practice.

Follow Iowa Soybean Association's YouTube channel to learn more about how to maintain edge-of-field practices.

If you have questions about edge-of-field practices, reach out to ISA's conservation services managers:

- **Alex Buseman** abuseman@iasoybeans.com
- **Brandon Iddings,** biddings@iasoybeans.com

Grazing Cover Crops

BY BROCK WEBB
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Key takeaways:

1. Short-term economic impact when grazing cover crops.
2. Early seeding cover crops increases biomass and feed value.
3. Regional cost-share opportunities help incentivize livestock grazing cover crops.

An often-overlooked benefit of cover crops is the ability to provide quality grazing for livestock. Grazing cover crops has been shown to be the most economically beneficial way to integrate cover crops into row crop production.

There are several decisions to make when planning for a successful cover crop establishment. Grazing livestock on cover crops can reduce feed and labor costs while promoting soil health. While the soil health benefits may take time to appear, grazing them can provide a more immediate ROI.

Infrastructure for grazing

Adequate fencing and water resources are crucial considerations before implementing cover crops for grazing livestock. If you plan to use temporary fences, you must determine the height and size of fences you'll need. While permanent water sources aren't essential, it can save you time from hauling water to the field.

Optimizing acres

Livestock farmers who graze their animals on corn stalks could maximize their acres by adding cover crops. While grazing soybean acres provides little value, cover crops can improve those acres, especially with proper fencing and water infrastructure. A study conducted by Practical Farmers of Iowa found that farmers who grazed their livestock on cover crop acres realized an average return of $77 per acre. To increase biomass from your cover crops, consider extending the cover crop's growing season by planting shorter maturing soybeans and shorter season corn hybrids.

Nutrient value

When selecting species for grazing, prioritize nutritional value.

Determine if fall or spring grazing will work best for your needs. In some cases, species selection enables both seasons of grazing if livestock do not overgraze the cover crop.

Diverse cover crops will also help meet livestock nutritional needs. For fall and spring grazing, you can mix several species; oats, turnips and tillage radishes are ideal for fall grazing.

For spring and fall grazing early establishment of cereal rye, triticale, wheat and barley can provide great opportunity.

Speaking with your local cover crop seed salesman on seed availability and species selection will help you make this decision. There are many other options for species, and you can tailor this decision based on your goals and needs.

Application strategies

Timing and seeding method are key to maximizing biomass for grazing. For livestock producers, aerial application — by plane or drone — may be the most effective option.

Aerial applications allow for earlier seeding than drilling, which can be an advantage to overall biomass produced. In this case, seeding rates should be increased to ensure better establishment across the field.

Drilling cover crop seed allows for better seed-to-soil contact and overall better stand in the field.

A study by Practical Farmers of Iowa found that farmers who grazed their livestock on cover crop acres realized an average return of $77 per acre.

Broadcasting seed into a standing crop with a high clearance ground rig provides a more uniform stand than aerial seeding.

If applying seed to a standing crop, pay attention to the maturity of the crop and future weather conditions. For ideal germination, apply the seed before it rains.

Once soybean leaves start to turn yellow, the cover crop can be broadcast into the canopy. This allows enough sunlight for emergence given there is adequate moisture.

Herbicide considerations

Herbicide selection throughout the year should be reviewed to ensure there is no herbicide carryover that would prevent livestock grazing. To ensure that herbicide carryover is not an issue, read labels carefully and follow rotation restrictions of the products. There has been little research on herbicide carryover affecting cover crops, so it's best to play it safe when in doubt.

Cereal rye is less sensitive to carryover while tillage radish may be more sensitive.

When using a broadleaf herbicide with residual, it is best to select a grass species and when using a grass herbicide focus on broadleaf covers.

Cost-share options

There are many cost-share opportunities for livestock producers who want to add cover crop grazing into their operations. One example is the Water Quality Initiative in Taylor County, where farmers can sign up for $35 per acre for any cover crop acres that are used for grazing. Statewide, Iowa Department of Agriculture Land Stewardship (IDALS) has a cost-share program for new and existing cover crop acres.

When applying for state and federal cost-share programs, check if grazing is allowed on cover crop acres.

The addition of cover crops to a row crop operation can create opportunities for livestock producers without additional land purchases. It can increase the efficiency and profitability of every acre under the right conditions and management.

Do you have land but no livestock? Consider renting your acres to livestock farmers. The Midwest Grazing Exchange can help match producers with cover crop grazing opportunities.

Having a plan is key when implementing new practices. Grazing cover crops are proven to provide short-term economic benefits even without the help of cost-share programs.

Dig deeper into the economics of cover crops through ISA's Cover Crop Economics Simulator tool.

Scan the QR code or go to iasoybeans.com/CoverCropSim to access this tool.

Mighty Prairies: Big Impact From Small Plantings

BY BRANDON IDDINGS
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Key takeaways:

1. Native prairie plantings have many soil, wildlife and downstream benefits.
2. Small unproductive areas of farm ground could provide economic, environmental and recreational value if seeded to native prairie.
3. Cost-share opportunities are available to help farmers get started.

Fields of green soybeans and corn line the highways and byways throughout Iowa. Every few miles, passersby might see a flash of different colors. These areas are often native prairie fields, filled with flowers and grasses often in shades of yellow, purple, pink, white and green.

What you don't see in these areas is the quiet work of these vibrant wildflowers, improving soil health, reducing soil erosion, enhancing water infiltration, water quality protection, carbon sequestration and providing habitat for pollinators and other wildlife. These benefits add value to your farming operation in a multitude of ways. According to Iowa State University's Natural Resource Ecology and Management (NREM), converting 10% of your unproductive or unprofitable acres to prairie can reduce sediment runoff by 95%. This conversion can reduce total phosphorous and nitrogen lost through runoff by up to 90%, according to NREM. In the last two years the Iowa Soybean Association (ISA) has worked with 35 landowners to restore 275 acres of native prairies from both unproductive and unprofitable crop acres and low diversity scrub ground not in production.

In these 275 acres we have reduced nitrogen loss by 6,552 pounds per year and phosphorus by 269.4 pounds per year. These native prairies can have a huge benefit to farming operations, especially with cost-share programs like Conservation Reserve Program, and the Science-based Trials of Rowcrops Integrated with Prairie Strips (Prairie STRIPS) program.

Explore cost-share options

Cost-share opportunities help establish these areas and receive a yearly per acre payment comparable to your crop yields or rent payments, depending on Corn Suitability Rating (CSR). Additionally, native prairie plantings can help sequester carbon long term. When prairie grasses grow and die, they establish deep roots that create a carbon reservoir underground. This buildup of carbon over time can enhance these less profitable and less productive acres, making them more profitable and productive in the future.

Discover recreational value

There are also recreation benefits in these areas, as they tend to be suitable habitats for upland birds like pheasants and quail, and bedding and food sources for deer. These areas are also home to many native flowering plants that benefit many species, including the monarch butterfly and the endangered rusty-patched bumble bee.

Variety of benefits

Small areas of pollinator plantings can provide a range of benefits, including reducing herbicide drift and runoff, which helps protect surrounding ecosystems and wildlife. These practices support productive agriculture by promoting healthy soils and fostering beneficial insect populations.

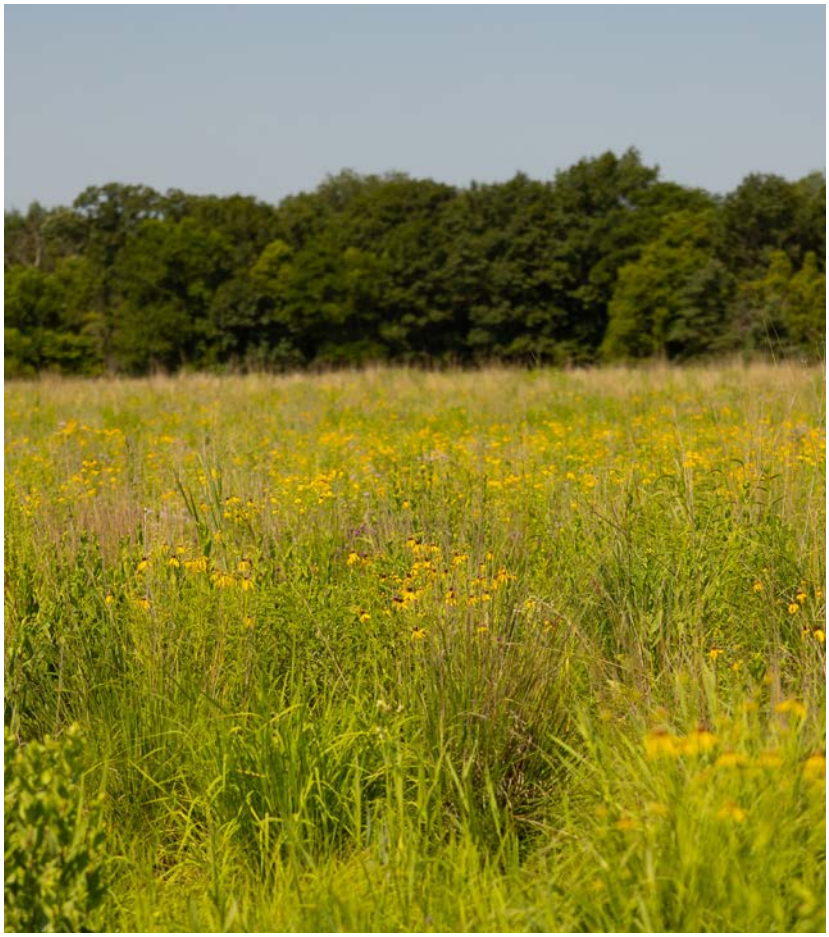
Some effective strategies include planting prairie or buffer strips 15 to 30 feet wide, which can trap herbicide runoff and reduce drift. These border plantings also help control erosion and expand habitats for pollinators and other wildlife.

Other helpful conservation practices include using cover crops, conservation tillage, terraces, tile drainage, windbreaks, natural buffers near sensitive areas, specialized spray nozzles, lower spray heights and adjusting applications based on wind speed. These approaches contribute to a healthier landscape while supporting long-term agricultural productivity.

Rethink unproductive areas

When harvesting this fall, watch the yield monitor for unproductive areas and consider how that small area could have exponential benefits to the rest of the field. These often small and overlooked areas, if converted to a native prairie planting, could provide value to you economically, recreationally and environmentally.

Interested in seeing what ground might be suitable to establish native prairie to have the most benefits? Contact me at biddings@iasoybeans.com.



Prairie plantings provide habitats and improve soil health.

Tillage Timing

BY MIKAELA CONNELLY
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Key takeaways:

1. Temperature and moisture are important considerations when planning a tillage pass.
2. While tillage solves some problems, it can also create others; consider timing and depth.
3. Reach out to an agronomist or conservation practitioner to weigh pros and cons if considering a practice transition.

Some farmers consider tillage to be an important practice to prepare the soil, control weeds and break down the residue of the previous crop. The goal is to create optimal soil conditions that encourage seed growth and promote the development of crops throughout their lifecycle, resulting in increased yields.

While conventional tillage is one form, no-till, vertical tillage and strip tillage are three others; the best choice depends on equipment, crop, soil, weather and goals.

General pros and cons

Tillage can be helpful as an effective means of weed control compared to herbicides. With increasing herbicide resistance, tillage can help eliminate weeds, unless the weed grows from rhizomes or stolons, such as field bindweed and ground ivy.

Tillage can worsen the infestation of these weeds by scattering pieces that grow into new plants.

Tilling helps redistribute nutrients in the soil profile depending on where nutrients are placed during application (i.e. broadcast vs. incorporated). Additionally, nutrient availability can increase slightly as organic matter breaks down but then reverts to normal levels. Tillage can help incorporate heavy residue to allow for easier emergence for seedlings in the spring.

However, tillage can also negatively influence soil health and weed densities. Tilling fractures soil aggregates and destroys soil structure. The loss of soil structure causes an increase in surface runoff and soil erosion, eroding topsoil and depositing sediment in waterways. Even in fields not prone to water-mitigated erosion, tillage (especially in the fall) can allow for wind-mitigated erosion that can have a long-term impact. This sediment can transport nitrogen and phosphorus from fields into lakes and streams, which can lead to water quality concerns.

Additionally, tillage can cause a hardpan and increase soil bulk density, which is a measure of compaction. If there is an increase in compaction, the plant's root system could be impacted, thus influencing overall plant health.

Tillage releases carbon dioxide, which influences other soil health factors. For example, soil organic carbon supports the soil biological community because it is a primary energy source for microorganisms. A negatively influenced biological community can affect organic matter decomposition and symbiotic relationships.

Considerations

There are a couple of factors to consider prior to tilling, such as soil moisture and soil temperature. Both can influence soil structure, tillage depth, clod size and soil compaction.

If tilling wet soil, it's likely residue won't be incorporated, and there is a higher likelihood of increasing soil compaction. Tilling cooler soil can help increase the soil temperature and reduce the amount of fracturing the soil likely goes through.

Fall tillage

If the weather cooperates after harvest, fall tillage can be a better option than spring tillage. Typically, the soil moisture in the profile is below field capacity, so there is a decreased likelihood of significant compaction.

Additionally, the soil temperature is more ideal than the spring, reducing breaking of soil aggregates into small clods. However, tilling in the fall can have some drawbacks. The soil is left unprotected for longer with fall tillage, so there is a higher likelihood of topsoil eroding with strong winds and snowmelt.

Spring tillage

Given all the fieldwork that happens in the fall, some farmers push tillage to the spring. Tillage in the spring has a few benefits. This enables timelier planting, creates a uniform seedbed and speeds up germination and emergence. Spring tillage helps to create larger macropores which can allow for greater aeration, so the soil can warm up and allow for quicker crop emergence.

Spring tillage can also take care of some winter annuals, such as field pennycress, prior to an herbicide pass. However, tilling in the spring increases soil compaction. Soil compaction can limit some nutrients to the growing plant like potassium. Potassium is immobile in the soil and less available in compacted areas due to the inability for plant roots to explore compacted soil effectively. Tillage in the spring creates a variety of sizes in soil aggregates, but fine aggregates, in addition to spring moisture, can cause crops to be more prone to crusting.

Your approach

Tailor tillage to fit your farm's needs. Tillage can be a helpful tool to solve problems (nutrient distribution, herbicide resistant weeds and seedbed preparation), but tillage can also induce problems for your field (compaction, reduced organic matter over time and erosion) depending on timing and depth.

If you are considering transitioning from one tillage type to another, contact Iowa Soybean Association's research or conservation agronomists for support.

A soybean emerges from a no-till field.
ISA file photo.

There are pros and cons of tillage practices and timing.

One Acre, Three Crops, Two Years: Relay Cropping in Iowa

BY LUCAS DE BRUIN
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Key takeaways:

1. Relay cropping is more successful south of Highway 20.
2. Relay cropping is more profitable when the small grain is sold for cover crop seed.
3. RCFI is gaining insights in this trial on fertilizer rates, row spacing and planting dates.

In contrast to double cropping, relay cropping entails the management of two crops grown together, with each crop harvested at its peak maturity. Most frequently, relay cropping involves a cereal grain and soybeans. The goals are multi-faceted, focusing on economic return and soil quality. In improving soil quality, the emphasis is on soil structure, erosion and nutrient sequestration.

Iowa Soybean Association's (ISA) Research Center for Farming Innovation (RCFI) is gaining insight during this project into optimal fertilizer rates, row spacing and ideal planting dates for both crops to maximize return on investment. While growing the crops at the same time, it is important to consider each crop's needs while monitoring and minimizing any negative effect on the other crop.

All current research except one location has been focused on cereal rye with the balance exploring wheat. There is a greater chance of success with relay cropping south of Highway 20. Relay cropping reduced soybean yields by 56% north of Highway 20, and by 19% when south of Highway 20 (Figure 2).

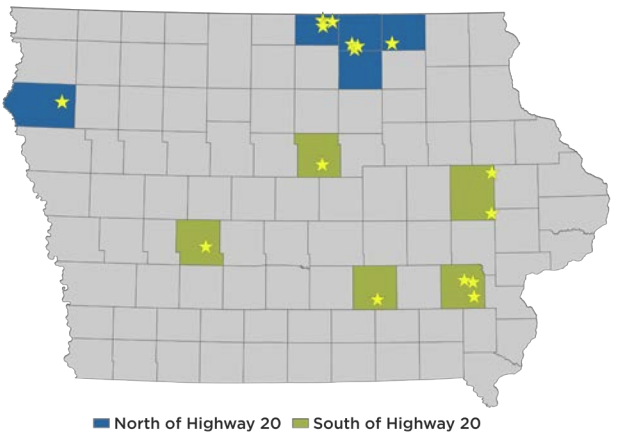

Figure 1: Iowa Soybean Association conducted 19 trials across Iowa from 2020 to 2024.

Balancing crop needs

Managing two crops increases competition for nutrients and moisture. A fertility plan is essential to meet the small grain's needs, which differ from soybeans throughout the season.

Small grains are grasses and therefore respond well to nitrogen. The recommended rate is 30 to 50 pounds of nitrogen per acre. Higher nitrogen rates may cause lodging in the small grain and reduced soybean nodulation.

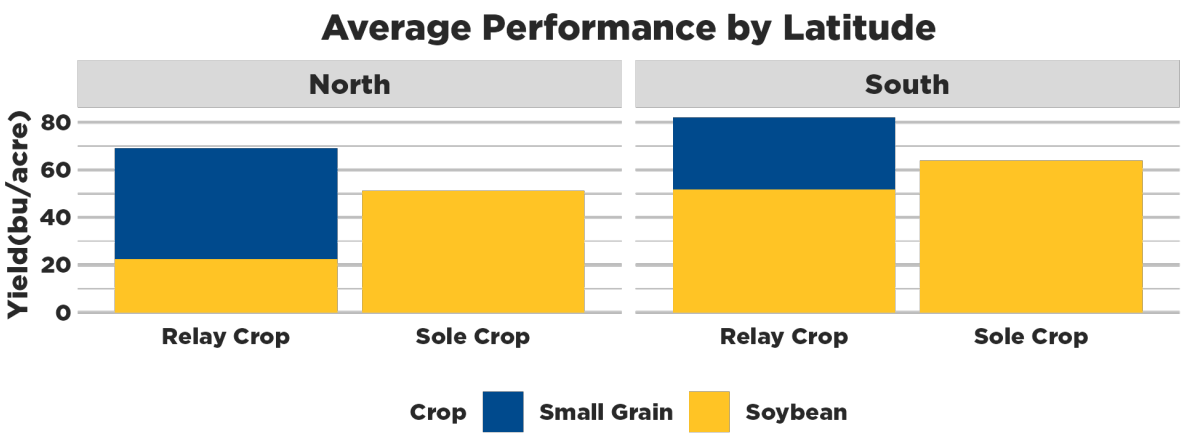

Figure 2: Relay cropping reduced soybean yields by 56% north of Highway 20, and by 19% south of Highway 20.

Late-season rains after the small grain harvest can boost soybean yields.

One early-season benefit of including a relay crop is better water infiltration. More living roots in the soil enhance infiltration rates, helping reduce ponding and allowing for more fieldwork days in the spring.

Improved infiltration also supports greater water-holding capacity in the soil, enabling crops to better withstand dry conditions. The small grain will also actively utilize the available moisture for growth and can help reduce excess moisture. However, the small grain can also out-compete soybeans for water in drought conditions, harming yield.

Row spacing considerations

Row spacing affects light interception and the effect of equipment traffic damage.

Combines with narrow tires and soybeans planted in 30-inch rows parallel to the small grain harvest can help decrease the damage to the soybeans during the small grain harvest. The use of skip rows or row indexing for where tires will be driven can also further protect the soybean plants.

Early canopy of the small grain will increase overall light interception, reducing weed pressure. After small grain harvest, the soybeans will benefit from full sunlight and begin to rapidly grow to fill the row. Soybeans within relay cropping are often slightly shorter but branching and pod numbers are increased.

Managing for profit

Although soil quality benefits from relay cropping, is the practice profitable?

According to ISA trial data, the profitability of the relay cropping system varied depending on how small grains were marketed. When the small grain was sold as a commodity at $5 per bushel, relay cropping was the more profitable system in 47% of cases. However, when the grain was marketed as cover crop seed at $10 per bushel, relay cropping was more profitable 95% of the time, assuming soybeans were sold at $10 per bushel. These success rates are based on how often relay cropping outperformed the alternative system in profitability, using ISA data to compare outcomes under the two pricing scenarios.

There is potential to increase revenue by relay cropping, but market access is currently a limiting factor. The largest avenue to use the seed grown is as cover crop seed, whether that be used on the same farm it came from or cleaned and sold to others. Additional opportunities are currently limited to areas that have traditional or specialty markets for small grains.

For optimal relay cropping, planting small grains and soybeans earlier is key.

The earlier the small grain can be planted, the better chance of strong establishment and maximizing the tillering, which maximizes seed production.

Planting soybeans before the small grain begins stem extension (first node), will reduce wheel traffic damage to the small grain, while also maximizing the soybean yield potential.

2024 RESEARCH AND CONSERVATION

MEASURED IMPACT

By Joe McClure ISA chief officer, Research Center for Farming Innovation (RCFI)

Our team is committed to providing value to farmers across the state. To make an impact, the team focuses on projects helping farmers meet their productivity, profitability and sustainability goals. The RCFI team achieves this through on-farm research trials, partnerships implementing conservation practices and funding university research projects. Here's a snapshot of our work in 2024.

665,929 pounds
nitrogen load reduction to waterway

$2.41 million
external research funded

$1.20
leveraged in external non-checkoff funding *(for every $1.00 of checkoff funding)*

50,414 pounds
phosphorous load reduction to waterways

20
RCFI research topics

89
outreach publications

3,908
water samples analyzed

615
farmer partnerships

62,305
cover crop acres

62
edge-of-field structures built

Covering all Crop Bases

SOYBEAN RESEARCH & INFORMATION NETWORK

Cover crop use in a soybean management system is becoming more popular as farmers boost productivity and sustainability. Soybean checkoff-funded research yields not only best practice answers, but also validates benefits like reducing erosion, building organic matter and biodiversity in the soil, decreasing nutrient loss from leaching and runoff, and improving water quality and infiltration.

The Soybean Research & Information Network (SRIN) contains links in its Cover Crops Resource Library for selecting varieties and making other cover crop management decisions

www.soybeanresearchinfo.com.

CHECKOFF-FUNDED RESEARCHERS COVER EVEN MORE BASES WITH THESE HITS:

1. Selecting the species for the job. Choosing cover crop varieties adapted to the region and production system optimize benefits from planting to termination. In a checkoff study of 60 varieties, performance traits varied significantly. For example, cereal rye is favored as a good all-around choice with its soil-protecting biomass. Barley, winter rye and field pea have good herbicide tolerance, but radish, turnip and canola do not.

2. Making seed timing decisions. Cover crops can be seeded via aerial application or by pre-seeding or inter-seeding into standing soybeans. Checkoff-funded studies show inter-seeding or aerial broadcasting show promise in reducing nematode populations. A good cover crop stand improves soil health for the next crop and is a grazing forage resource, a wildlife food source and nesting habitat and a site for increased insect pollinator activity.

3. Planting soybeans earlier for better yield. Studies are looking at whether the presence of a cover crop can facilitate ultra-early soybean planting in some areas to increase yields. While a spring freeze can negatively impact the soybean stand, researchers are finding overall plant survival is intact as cover crop residue protects the young soybeans. Several trials are looking at best timing for cover crop termination in the spring.

4. Developing cover crop advice for irrigated fields. Researchers are assessing the effect of cover crops and tillage alone and combined on irrigation efficiency, soil properties, runoff, soybean yield and economic return. The goal is to create best management practices that can be shared with farmers who have irrigated soybean production systems.

5. Suppressing weeds, diseases and insects. Cover crops give farmers more tools to implement integrated pest management strategies. Trials highlighted by the checkoff's Take Action program show how cover crops help provide effective weed suppression. Other research weighs seed treatment use in controlling seedling diseases and soybean cyst nematode and the impact of cover crops on insect populations, including slugs.

Protect Input Investments

BY SHANE BECK
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Key takeaways:

1. In 2024, nitrogen inhibitors protected 18-28 bushels per acre of corn yield.
2. Weather during the winter and spring of 2024 promoted conversion to unstable forms of soil nitrogen and allowed it to leach from soil.
3. One year with high protection of nitrogen can pay for the next few years of nitrogen inhibitors.

Nitrogen is one of the most important nutrients and a significant cost required to grow a bushel of corn. Nitrogen is required for optimal growth, including chlorophyll production, and to achieve yield potential.

It takes anywhere from 0.6 to 1.2 pounds of nitrogen to produce a bushel of corn. This means that to grow 250 bushels per acre of corn, we would need between 150 and 300 pounds of nitrogen.

Keeping nitrogen in place

Nitrogen can be lost from the soil through leaching throughout the soil profile, with soil particles through erosion or volatilization when exposed to the environment. How can producers protect the nitrogen once it is applied and ensure that it is available for plants when it is needed?

One way to do this is through nitrogen stabilizers, which help protect nitrogen by slowing down chemical reactions in the soil. This keeps the nitrogen from leaving the soil either through leaching in the soil with water or volatilizing into the atmosphere.

There are two types of nitrogen stabilizers: urease inhibitors and denitrification inhibitors. The urease inhibitors prevent the conversion of urea into ammonia which can be volatilized into the atmosphere.

Denitrification inhibitors prevent the conversion of ammonia to nitrate, which can be easily leached through the soil and into surrounding streams.

Keeping nitrogen in the field protects the farmer's investment and the environment from added nitrates to water sources.

ISA trial results

In 2024, the Iowa Soybean Association's (ISA) Research Center for Farming Innovation (RCFI) conducted two trials looking at the use of a denitrification inhibitor with anhydrous ammonia applied in the fall of 2023.

Both trials were applied in mid-November once soil temperature dropped below 50 degrees.

One of the trials was corn following corn and the other corn following soybeans. There were two different target rates for the fields. The corn following corn field had a target rate of 220 pounds of nitrogen per acre and the corn following soybean field had a target rate of 160 pounds of nitrogen per acre. There was no extra nitrogen added to the field throughout the growing season.

Winter weather is a factor that has a great influence over nitrogen conversion rates. The winter of 2023-2024 was unusually mild. Although there was a two-week window toward the middle of January where we saw temperatures dip significantly below 0 degrees, a thick layer of snow covered the ground insulating it from the extreme cold temperatures.

The ground never froze during the winter due to the mild temperatures

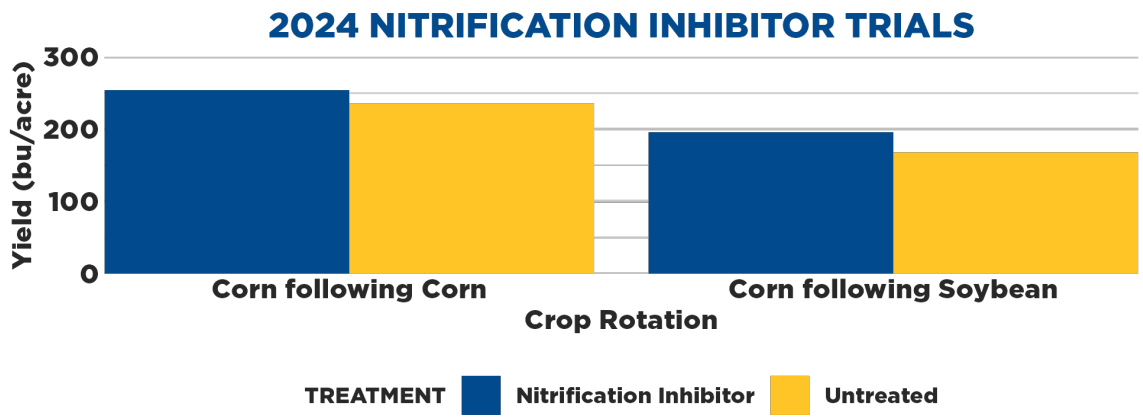

Figure 1: Results from two farmer-submitted nitrification inhibitor trials. Nitrification inhibitor improved yield compared to untreated strips.

and the lack of moisture due to the drought during the summer of 2023. Additionally, the spring of 2024 was excessively wet. The combination of these weather conditions allowed for greater nitrogen leaching though the warmer soil conditions and higher rainfall early in the season.

Overall, we saw a significant positive yield response from applying the nitrogen inhibitor with the anhydrous ammonia in the fall of 2023 (Figure 1).

The corn following corn field showed an 18 bushel-per-acre yield advantage with the nitrogen inhibitor compared to the area without the added nitrogen inhibitor.

The nitrogen use efficiency (NUE) was 0.87 pounds per bushel where the inhibitor was applied and 0.93 pounds per bushel where no inhibitor was applied. Whereas the corn following soybean trial experienced a 28 bushel-per-acre yield advantage when using the nitrogen inhibitor compared to the area without the inhibitor. The NUE was 0.82 pounds per bushel where the inhibitor was applied and 0.95 pounds per bushel where no inhibitor was applied.

The discrepancy in yields between fields is most likely due to the extra 60 pounds of nitrogen applied to the corn following corn field.

The cost of this nitrogen inhibitor was around $20 per acre, requiring a positive response of 4-5 bushels to the acre, at a market price of $4-5 per bushel for economic breakeven. As shown in the figure above, the fields achieved that easily with increases of 18 and 28 bushels.

Another way to think of this is that these results paid for the next four to six years of nitrogen stabilizer product because of the yield advantage from one year. Even if there is a year where the winter and spring are cold and dry, which will lead to very little nitrogen loss, there would be the benefit of previous years being profitable and absorbing this cost.

Protecting profit and the environment

Nitrogen stabilizers are valuable resources available to farmers. It can protect the farmer's investment from leaving the field before it is available to the plant. It also helps protect the environment and keep our water sources clean. Even though stabilizers may seem a little costly, nitrogen stabilizers can very easily pay for themselves when the weather conditions promote high rates of nitrogen conversion.

Looking beyond 2025, ISA's research agronomy team plans to conduct more research on this topic. ISA will analyze more individual farmer-submitted nitrogen inhibitor trials in the 2025 growing season and will conduct replicated strip trial studies focusing on the use of nitrogen inhibitors with anhydrous ammonia and timing of the application. These trials will look at yield and how nitrogen moves throughout the soil profile by conducting regular soil samples.

A Practical Guide to Cost-Share Programs

BY BEN POREPP
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Key takeaways:

1. Cost-share programs make conservation more accessible and less risky.
2. Expert guidance is essential for success.
3. Conservation is a long-term investment with real results.

For farmers exploring the implementation of conservation practices into their operation, cost-share programs can help reduce potential financial risk while opening the door to a more sustainable and profitable future. Figuring out where to start, who to contact, and what funding is available can be overwhelming, but the conservation team at the Iowa Soybean Association (ISA) is here to guide and support Iowa farmers every step of the way.

Implementing conservation practices — like cover crops, prairie strips, bioreactors and saturated buffers — is an investment in your land's future. But these practices also cost money. Cost-share programs can help offset implementation costs, making it more feasible for farmers to take the first step in improving soil health and water quality on their farms.

Getting started

Reaching out to a local conservation practitioner should always be your first step. Assistance from an ISA conservation agronomist, Natural Resource Conservation Service (NRCS) district conservationist, registered technical service provider or watershed coordinator ensures you're not alone through the process.

By working closely with conservation experts, you minimize potential financial risks and ensure the practice you are implementing maximizes your farm's agronomics and ROI.

Here are some questions to ask these practitioners:

What conservation practices are most suitable for my land?

Tailor your approach to your soil types, slope, crop rotation and conservation goals.

Is in-field support from conservation experts available to help with implementation?

Some programs offer free implementation support for things like conservation planning and engineering.

What programs are currently open for application, and what are the deadlines?

Deadlines can vary widely. Federal programs have strict cutoff dates, while local or nonprofit programs may operate on a rolling basis.

Can I stack funding from multiple sources?

Some programs allow cost-share stacking (e.g., state and private), while others do not. Your practitioner can help ensure you're compliant.

Cost-share and what's out there?

Program funding is most commonly available from federal, state and private sources. Each program has its own eligibility requirements, priorities and funding windows.

Here are some examples of common cost-share programs and an overview of what each provides for farmers:

Federal programs

NRCS, through the U.S. Department of Agriculture, is a major provider of federal cost-share funds. Programs like the Environmental Quality Incentives Program (EQIP) and the Regional Conservation Partnership Program (RCPP) offer significant support.

- EQIP focuses on planning and implementing specific conservation practices.
- RCPP helps leverage public/private partnerships to deliver new conservation practices to targeted areas across Iowa.

To apply, work with your local NRCS office to create a conservation plan and meet the application deadline.

State programs

The Iowa Department of Agriculture and Land Stewardship (IDALS) offers state cost-share funds for practices like cover crops, no-till and edge-of-field practices. These programs often work through Soil and Water Conservation Districts and can be more flexible and timelier than federal funds. State cost-share programs often pay slightly lower amounts but typically require less paperwork and have shorter wait times compared to federal programs.

Local watershed

Local watershed groups or county-level initiatives may also have targeted cost-share funds supported by state, federal or nonprofit grants. These often focus on priority areas with known water quality concerns.

Nonprofit and private sector funding

ISA, AgOutcomes, Practical Farmers of Iowa and local cooperatives may offer additional cost-share or incentive payments, especially for pilot programs, demonstration projects or research collaborations.

Dollars with direction

Cost-share programs continue to be in high demand, but do they really work?

Farmers say yes. Over the past two years, ISA has seen a significant uptick in the adoption of conservation practices. In that time, ISA has worked alongside more than 400 farmers to implement numerous conservation practices utilizing various cost-share programs. This effort has resulted in the installation of more than 100 edge-of-field practices including oxbow restorations, saturated buffers and bioreactors that are designed to improve water quality and reduce nutrient loss.

ISA has also supported the implementation of in-field practices on more than 125,000 acres of farmland, including cover crops, reduced tillage and no-till systems. More farmers are seeing the benefits of these practices on their own farm, and cost-share programs can help you see them on your own farm.

A long-term investment

Incorporating conservation practices into your farming operation isn't just about cost-share payments; it's a long-term investment in soil health, yield stability and water quality.

While cost-share programs provide valuable financial support, the most successful and lasting conservation efforts are driven by a deeper commitment — a personal conservation goal and a vision for a healthier, more sustainable future.

Cost-share programs are powerful tools that work best when aligned with a farmer's own desire to improve their land, protect water quality and build resilience for the next generation. Incentives can help get practices on the ground, but the long-term rewards of conservation go far beyond any single payment.

Our partners at the Iowa Agriculture Water Alliance have developed a cost-share comparison guide to help answer questions.

Scan the QR code to access this tool.

The Soy Checkoff invests in research to increase farm productivity, earning a nearly $6-to-$1 return[1] on that investment. This translates to increased yields, improved quality, and enhanced global competitiveness.

SOY CHECKOFF™

Learn more at unitedsoybean.org/bettertogether

1 ROI: Kaiser, H.M. 2024. An Economic Analysis of the United Soybean Board and Qualified State Soybean Boards' Demand- and Supply-Enhancing Programs. Cornell University.