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No-Tillers and Landowners Work Together for Value

The landowner-tenant relationship will be forever fraught.

19th-Century humorist Ambrose Bierce once wrote that Ireland was fairly divided between tenants and landowners. Tenants, Bierce wrote, "have all the ire, while they (landowners) have all the land."

That was the worst-case scenario. Looking at the difference in roles on either side of the lease is illustrative to where the tension comes from and why it persists today. It's also helpful to bear in mind while you read this report the difference between a farmer and a no-tiller.

No-tillers, after all, are expert farmers. They know how to grow lots of food, fiber and fuel to make money. They know what equipment, chemicals, seeds and fertilizers to employ to make the land bear. More than that, they're business-savvy operators with an eye on both revenues and expenses and expertise in manipulating both to their advantage. The no-till vision also predisposes growers toward medium and long-term thinking, more so than the conventional grower's focus on yield.

Short-term, landowners are the recipients of the rent check, but also have a vested long-term interest in retaining value, as well. After all, if a field or farm is depleted of its ability to yield, what is there to sell? What can be passed on to descendants? How do landowners even receive that rent check on a dependable basis, each month or year, in the first place?

In this special report by the editors of *No-Till Farmer*, you'll find expertise on both sides of the table.

We talked to landlords who want their ground treated well and who were willing to walk away from landlord relationships to achieve that.

We scoured possible sources for income beyond the seasonal yield figures.

You'll hear from a landlord directly insistent in getting no-till practices on to his property.

We talked to academics who put a hard dollar amount on the value no-till adds to the land.

For no-tillers. Landowners might be useful in helping to accomplish your no-till objectives. We've designed this downloadable report to be printed and shared with your landowner, to start the discussion you might have been meaning to have for a while, or to stand out from conventional renters.

For Landowners. If you're a landowner who already leases ground to a no-tiller, congratulations! You've got a valuable partner interested in maintaining your land's long-term profitability. If they handed you this report, it's to explain what they're up to on your land and why it might look different than the surrounding farms.

If your tenant is a conventional grower and they handed you this report, they might have an eye toward trying something new, like eliminating tillage, or planting cover crops. No one can tell you what to do with your land, but I would encourage them to switch. Ask them what they're thinking about trying and why. Keep an open mind. Ask them what practices they employ on the land they both own and farm.

If you're evaluating prospective tenants, we hope this report shows you why no-tillers should receive extra weight in your decision-making process.

If another landowner has handed you this report, we also have tips for how to "speak no-till" to your tenants.

Above all else, this report is designed to spark conversations between no-tillers and landowners, with an eye toward benefitting both parties.

Let's start the discussion.

Brian O'Connor | Lead Content Editor, Conservation Agriculture
boconnor@lessitermedia.com

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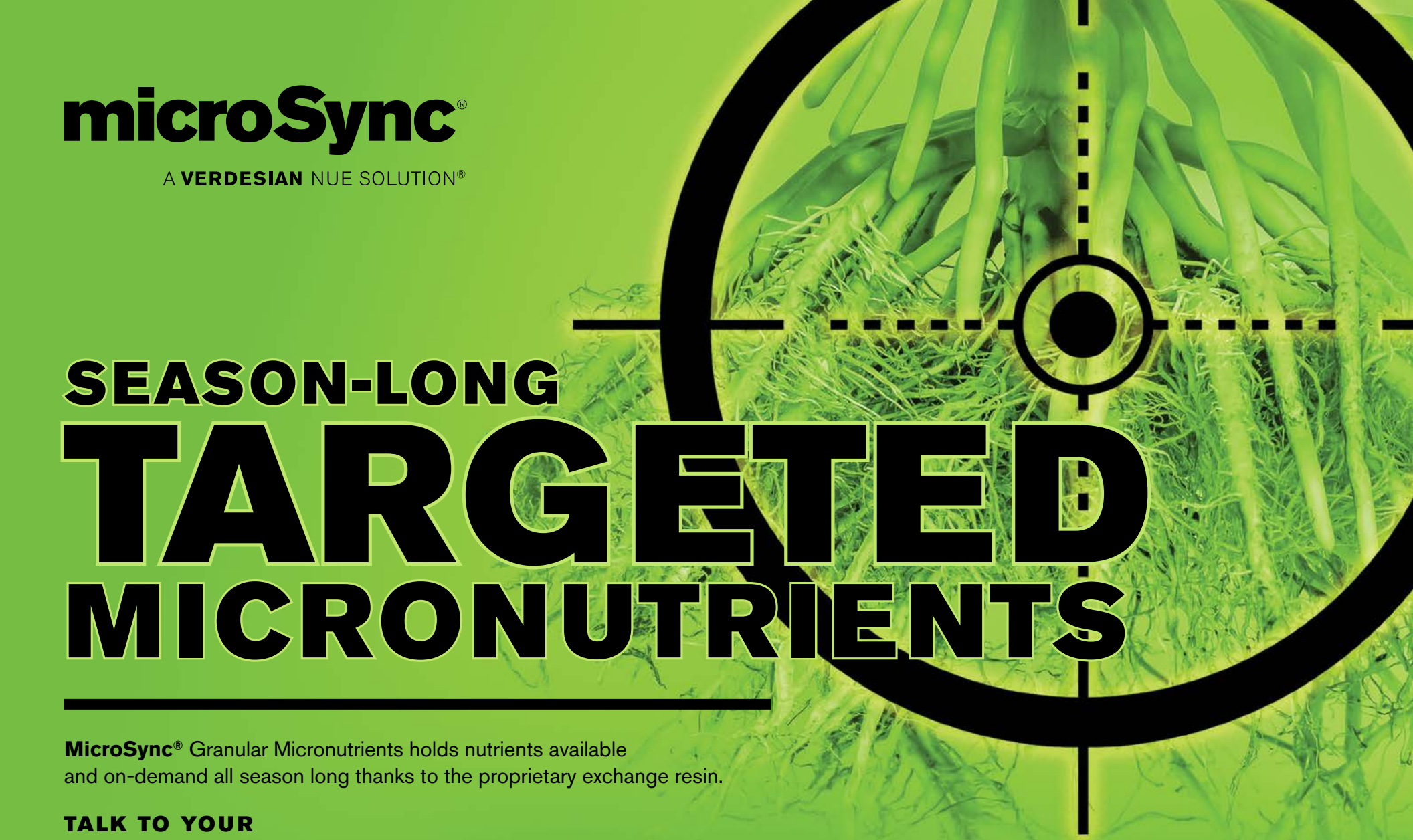

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A Landowner's Responsibility

All of society has an interest in the land used for our food production and recreation, and therefore the owners and renters have a responsibility to treat it in the best possible manner.

By Larry Neppl, Cedar Rapids Iowa

I guess you would not say I am the typical landowner. My father built the first terraces in our county on a farm that he rented. He also served as a commissioner of the local Soil and Water Conservation District for several years. He taught me the value of conservation.

For over 30 years I managed farms in northwest and northcentral Iowa for absentee farm owners whom I worked closely with to make soil and water conservation an important part of our farm plans. I convinced my farm operators to stop moldboard plowing, move to chisel plows and eventually leave soybean stubble untilled in the fall.

By the time I retired in 2000, nearly two-thirds of the farms I managed were practicing ridge-till where we left all crop residue on the soil surface following harvest, banded our P and K fertilizer in the ridge instead of broadcasting them on the soil surface, banded our herbicides which further reduced the costs of inputs and used only two cultivations in the tillage processes. This also reduced the machinery costs and fuel costs for the operators.

PRACTICAL FARMERS. Kelly Blair (left), speaks with PFI members Larry and Ruth Neppl. The Neppls have been PFI members since 1988, and knew Kelly's father, A.J. Blair, as a boy. They rent land to Kellie and A.J.

In 1989 we were recognized as the first-place winner in the Professional Farm Manager division for soil and water conservation practices by the National Association of Conservation Districts.

Turning to No-Till

My wife and I own 40 acres in Palo Alto County, Iowa, where she grew up. Our farm was in a corn/soybean rotation, crop share lease and with full-width tillage. Several years ago, I started studying and reading a lot about no-till, strip-till and cover crops. We decided to move to this type of operation and wanted a farm operator who had experience with no-till, strip-till and cover crops so we could hit the ground running. We also wanted a younger farmer so we could help him/her with more land.

I went to local coop elevators, banks, chemical and seed dealers asking if they knew of a potential farm operator. Lastly, I went to the local NRCS office in our county, and they gave me the name of a seed, chemical and fertilizer retailer whom they knew was doing custom strip-tilling. We met with him and found that he had about five years' experience planting cover crops in the fall, strip-tilling and placement of fertilizer in a band

in soybean stubble in the fall before corn the following year, and then no-tilling corn and soybeans. He was 33 years old, an ag graduate of Iowa State University and worked as a crop consultant for the retailer we called, in addition to farming.

On another 50 acres farm we own one-third of in Webster County, Iowa, we decided the next year to find a new farm operator as we were not happy with the yields and the way it was being farmed. I knew of a young farmer in the area who was doing the kind of farming that we wanted and had about 5 years' experience with no-till and cover crops. He was about 35 and an ag graduate of Iowa State, and a young farmer we could help.

On both farms, we are going to add small grains and legumes to the rotation to further improve our soil health.

We have been in this system long enough to start seeing the benefits of reduced soil erosion, vastly improved soil health and texture, increased soil organic matter and reduced costs of inputs. We are also convinced we are farming in an environmentally responsible manner to keep carbon in the soil and keep our topsoil and fertilizer nutrients and chemicals on the land instead of in the water systems.

No-Till Incentives

For many years I thought that government programs needed to increase the financial incentives for farmers and farm owners to substantially increase the use of practices that will reduce soil loss by wind and erosion and handle the climate changes taking place so that we could leave the earth better than we received it. It didn't seem like the payments were sufficient to get farmers to do no-tilling, strip-tilling and cover crops and they didn't last long enough.

However, I recently read *The Land Remains: A Midwestern Perspective on Our Past and Future* by Dr. Neil Hamilton, the now-retired head of the Agricultural Law Department of Drake University in Des Moines, Iowa. He made a compelling case that, yes, landowners own the land, but that doesn't mean they can do with it as they please. The land is part of our heritage and has been passed down for generations. All of society has an interest in that land for our food production and recreation, and therefore the owners and renters have a responsibility to treat it in the best possible manner. Society, in fact, has a right to place certain restrictions on the manner in which the land is farmed for the good of the whole society. He has convinced me.

"Most landowners don't understand today's farming and know little about conservation or soil health."

To further substantiate my feelings on this, I recently attended a webinar conducted by the Soil Health Nexus about conservation practices. Dr. Linda Prokopy of Purdue University and her colleagues have done extensive research about farmers' and landowners' conservation practices, why they do them and why they don't.

Most landowners don't understand today's farming and know little about conservation or soil health. Many farmers want to farm the way that their forebears did and falsely believe no-till will not work on their soils and they are in love with their huge horsepower machines needed to farm the way they do. Landowners and tenants rarely discuss it.

Dr. Prokopy said that their research states that it will take more than financial incentives to get owners and farmers to move to soil health and needed conservation practices to minimize erosion and reduce agriculture's effects on the environment.

What's No-till Worth to Landowners?

About $15 per acre in Iowa and about $8 per acre in other areas, according to research from North Carolina State University

By Brian O'Connor, Lead Content Editor

Growers and landowners have always known no-tillers treat the land a little better.

What hasn't always been clear is how much that TLC is worth. That is, until research released earlier this year out of North Carolina State University.

In Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, Oklahoma, South Dakota and Wisconsin, increasing no-tillage by 1% at the county level increases land value by an average of $7.86 per acre, researchers say.

1% more no-till adoption in an Iowan county increases land value by $14.75 per acre.

The How of How Much?

Rod Rejesus, an ag economist at the school, along with researchers in Turkey and New Hampshire, looked at three different data sets to determine how much no-till adds to land value over time.

"The benefits of no-till are slowly being capitalized into land values," he says. "Land values are typically based on expected future returns, essentially discounted forward to this day."

Those returns come primarily from the reduced cost of no-tilling farmland no-till, though some increased yield potential is also a possible contributing factor.

"1% more no-till adoption an Iowan county increases land value by $14.75 per acre..."

"If you have no-till and you know that there is both input cost benefits — lower cost of fuel and all that kind of thing, that lowers costs and increases profits — plus if there are some yield productivity benefits over time as well, all of those will be capitalized in the value of the land," Rejesus says. "And that's the mechanism by which no-till — whatever benefits it provides both on the cost side and the benefits side — will be slowly but surely capitalized into land values and I think that's what we're capturing here."

To get the number for the non-Iowa states, Rejesus and his team of researchers used data from the satellite-based Operational Tillage Information System (OpTIS) database constructed by the Indiana-based Conservation Technology Information Center and combined it

with land values from USDA's 2017 Agricultural Census.

Using both variables was necessary because the USDA census is only performed once every 5 years, while the OpTIS system records data in real time.

The numbers were more precise in Iowa because Iowa State University surveys land records on a yearly basis. For example, in 2021, the average cost of an acre of land in Iowa was $9,751, with a high average of $13,852 in Scott County near Davenport and the lowest average of $5,062 in Decatur County against the Missouri border.

Iowa also has the country's highest-value farming real estate, Rejesus points out.

"If you consider Iowa by itself, you would expect that distribution would be a little bit narrower and tilt toward higher values compared to a data set that includes other states that don't have prime agricultural land," he says. "The magnitudes are higher."

The other states are lower, both because their farmland isn't as highly valued, but also because the data set used to construct that $7.86 figure is composed of 11 different states, with a much wider range of values for farmland.

"We didn't estimate it state-by-state," Rejesus says. "There may be heterogeneity. An additional 1% increase in no-till might result in a higher increase in highly productive lands compared to low-producing lands."

In The Margins

Considering Iowa, would $14.75 per acre make a difference? A 1,500-acre farm at $9,751 per acre would be worth $14.62 million (not counting any houses or buildings). Adding the no-till bonus on to that same farm results in a $14.64 million price-tag, only $20,000, or about 0.2%, more.

The research is focused on "marginal decision-making," according to Rejesus.

That's fancy economics talk for producers or owners faced with decisions to increase or decrease something, whether the value of acres of land or the number of cars in a factory. For example, a grower looking to expand the number of acres must evaluate the expected profit against the costs of purchasing, renting, clearing additional land and additional labor and equipment costs.

"This has been talked about as potential benefit, but it's not front-of-mind."

"In my mind, this is mostly for the benefit of those landowners or farmers that are not yet quite convinced about no-till," he says.

It also brings economics and land prices to the forefront of the no-till discussion.

"This has been talked about as a potential benefit, but it's not front-of-mind," he says. "When you talk about no-till, a lot of people talk about soil erosion benefits, environmental benefits, and not land values. So if you're conventional right now and thinking about doing this, or even a landowner where the tenants are not no-tilling, this may be something to think about. Over time, this may be an additional benefit that may tilt the economics. Maybe they didn't consider the land benefit. Maybe that additional $7 may tilt them."

Implications

Rejesus's team looked at data at the county level, which has some interesting implications.

For example, if your neighbor isn't part of the 1% in your county that switch to no-till, does that mean he gets a value bump, too?

Rejesus can't rule it out.

"That could be true, sort of like a free-riding effect," he says.

A free rider is, in economic terms, a beneficiary of a good or service beyond the intended recipient. Building a lighthouse in a small seaside village saves passing ships from rocks. It also benefits the tourism industry by drawing tourists, but also piracy by saving pirate ships.

The paper's data set isn't refined enough to distinguish whether conventional growers could benefit from increased no-till.

"A 1% increase in general at the mean will increase land values," he says. "In general, the values will perhaps increase, but it may not be for the conventional tillage. That's another research effort to look at farm-level or field-level data, and those are harder to get."

No-till adoption is also associated with interest surrounding carbon markets which could potentially offset costs further and increase profitability for farms. Those markets are still developing, so it's likely the data the paper examined doesn't include those potential increases. There is some data suggesting other farm revenue boosts, like subsidies, are factored into land value.

"The conceptual idea here is that land values are a function of expected future benefits," Rejesus says. "Say the carbon markets become bigger. That's payments that are already associated with no-till. That could perhaps be capitalized into land value itself as well. That's a future thing to look at as well."

Cover crops are in roughly the same boat.

"We actually looked at that as a separate right-hand side variable," Rejesus says. "Cover crops by themselves, there's no effect right now, so that's why we didn't include it in this paper."

While no-tillers favor crops (About 80 % of respondents to the No-Till Farmer annual benchmark survey), the wider agricultural community adopted more slowly. Cover crop adoption is about 3.9% in Rejesus's data.

Future Questions

The OpTIS data is based on remote sensing. Could it possibly use remote sensing to examine, say, carbon storage?

Rejesus isn't optimistic.

"The key there is the data on the carbon," he says. "What you want instead of land values as the outcome, you want carbon as the outcome.

"The carbon is the hard data to get."

For now, Rejesus is focused on expansions that have occurred in the OpTIS data set itself. The database has just added additional states, but more states to the west and east are also planned. Rejesus and his research partners face something of a dilemma: do they update the study to include the newest states, which include parts of Ohio, Kansas, Nebraska, Missouri and North Dakota, or wait until the database includes the planned range extending from Western Colorado to the Mid-Atlantic and Northeast regions.

"Then we could redo all these analyses again," he says. "Maybe not state-by-state, but region-by-region, what's the heterogeneity of the impact? Is it still $7 in the Mid-Atlantic?"

Rejesus says the research contributed a concrete price tag to an abstract discussion.

"There's been a lot of work looking at soil health practices and not fully understanding the benefits," he says.

Increased data will continue to raise new questions, Rejesus says.

"The data on no-till adoption that's temporally longer has not been there before," he says. "And this allowed us to look at this issue."

No-Tilling Adds $112 Per Acre in Environmental Value for the Non-Farm Public

From improved water and air quality to greater carbon sequestration, no-till offers benefits not only to farmers but also to society as a whole.

By Frank Lessiter, Editor

While many of our readers certainly recognize the positive impact no-till has on their farm's profitability, most haven't recognized the environmentally-friendly value it also brings to America's non-farm population. By combining the extra cropping value enjoyed by growers with the climate-friendly environmental benefits of this practice, it's apparent to me that we've been underselling the overall worth of no-till.

Over the years, growers have told the No-Till Farmer staff that they've pocketed anywhere from an extra $25-90 per acre by switching to no-till. The typical no-till savings include less machinery investment, reduced input costs, fewer trips across the field, less labor needs, better water usage, lower nutrient needs and the ability to farm more acres.

Since the extra value differs among farms and fields, we're taking a conservative approach by settling on an extra return of $30 per acre as an across-the-board average for calculating the overall benefits of no-tilling in this article.

Based on a recent economic analysis by the Rural Investment to Protect Our Environment (RIPE) group, here's a rundown on the value this farmer-led, non-profit organization places on five key environmental benefits that occur with no-tilled soybeans:

Environmental Benefits	Per Acre Value
Carbon sequestration	$ 7
Soil health	$ 16
Air quality & health benefits	$ 20
Water quality	$ 25
Soil nutrients	$ 44
Total	**$112**

By adding a conservative $30 per acre earned by growers, the overall no-till benefit grows to an amazing $142 per acre. That represents $16 billion in extra value for the more than 110 million acres being no-tilled today in the U.S.

This group also looked at the environmental value of cover crops. By seeding cover crops after corn harvest, they estimated an overall environmental value of $102 per acre. Since many no-tillers save $15 per acre due to reduced fertilizer and pesticide purchases alone, adding these figures with the environmental-friendly benefits of cover cropping brings the overall value to $117 per acre.

More Dollars for No-Till

An independent farmer-led non-profit group, RIPE is proposing a program that will fully cover the cropping costs of protecting the environment for the general public. This is in contrast to the cost-saving concept used with current Farm Bill conservation programs.

Thanks to an $80 million grant rewarded through USDA's Partnerships for Climate-Smart Commodities program, the group has been able to launch its RIPE100 program.

"We will focus on the public environmental benefits, along with farmer benefits..."

— Aliza Wasserman-Drewes

Farmers and ranchers in Arkansas, Minnesota, North Dakota and Virginia can enroll in the 3-year pilot program. They will have the opportunity to be part of a program that will pay $100 per acre or animal unit payments for stewardship practices that deliver value to the public. These include conservation efforts such as carbon sequestration, greenhouse gas reduction, improved soil health, water quality, water conservation and other environmental services.

"We will focus on the public environmental benefits, along with farmer benefits," says Aliza Wasserman-Drewes, director of the group. "We want to demonstrate the value of these practices to the public. This program won't restrict the use of government ag cost-share programs and is designed to make sure future governmental climate policies won't hamper farmer profitability."

Adoptiing the group's climate policy would guarantee a fair return to farmers for their voluntary investments in practices that deliver public benefits for climate mitigation, clean water, healthy soil and other environmental services.

With the adoption of no-till, strip-till, cover crops or other environmental-friendly conservation practices, the program would compensate growers up to $100 an acre.

These would include practices that improve soil health, lead to cleaner water, reduce climate change, reduce flood damage, add biodiversity, improve pollination, sequester carbon and reduce crop water needs.

For measuring the overall value of conservation practices on the environment, scientific data would be used to compare the benefits vs. costs of doing nothing. For example, no-till water quality improvementwould be measured against the cost of cleaning polluted water from an acre of ground.

"We also believe growers currently no-tilling and seeding cover crops should be compensated for already using these practices," says Wasserman-Drewes. "We don't want to lock early adopters of no-till, strip-till and cover crops out of our program."

Hopefully, you've recognized the favorable overall value no-till and cover crops are already having on this nation's environment. With this information, there's no excuse for underselling the many merits of no-tilling and seeding cover crops to the American public

Landowner Buy-In Critical to Boosting Adoption of Conservation Measures

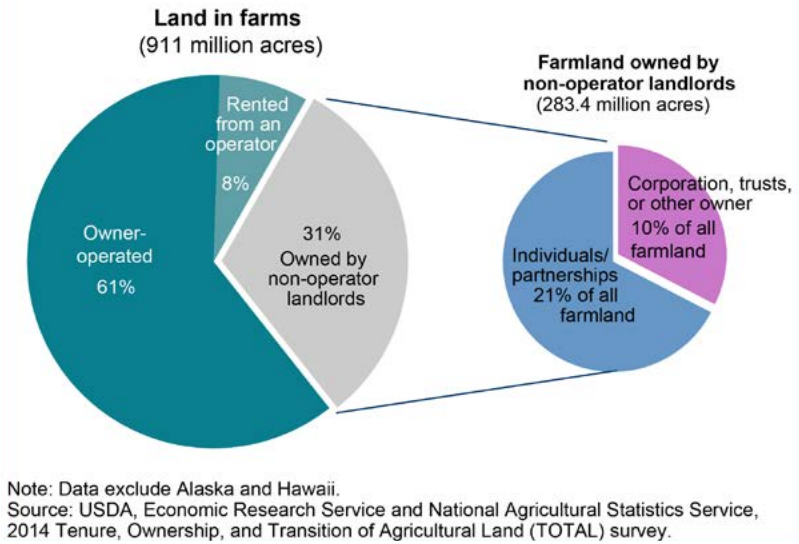
Studies show common interest between landowners and farm operators in conservation and overall long-term land productivity, but barriers exist to effective communication regarding lease agreements.

By Dan Crummett, Contributing Writer

While research shows conservation practices such as no-till and cover crops increase the value of farmland by improving the productivity of the soil, adopting these measures often has an immediate upfront cost and a less-than-immediate return on investment. This delayed economic reward, coupled with large numbers of absentee landowners eager for a rental check from short-term land leases, may be playing a large role in slowing the adoption of soil stewardship practices.

Nationally, about 40% of the total 911 million acres of farmland and pasturage in the Lower 48 states is rented by producers from landowners, many of whom are not producers and are not familiar with agricultural practices. In many areas involved in cash crop production, about 250 million acres nationwide, it's not uncommon for 50% of farmland to be rented acres, and in the heart of the U.S. Corn Belt, some areas are nearing 80% rented fields.

Acres Owned by Farm Operators, Operator Landlords and non-operator landlords, 2014



Note: Data exclude Alaska and Hawaii.
Source: USDA, Economic Research Service and National Agricultural Statistics Service, 2014 Tenure, Ownership, and Transition of Agricultural Land (TOTAL) survey.

LANDOWNERS VITAL. Land ownership by farm operators, operator landlords and non-operator landlords, including both row crops and other ag uses.

A 2019 collaborative study by Auburn University and Iowa State University economic researchers showed statistical evidence the adoption of conservation practices is lower on rented land for cover crops, buffer strips and ponds/sediment basins — but not for no-till. The study also highlighted economic reasons for policy changes in the tax code — tax credits or deductions — to entice non-operator landowners (NOL) to look more favorably to creating agreements involving soil stewardship.

A recent study by Le Chen and Rod Rejesus of North Carolina State University's Department of Agricultural Resource Economics showed adopting no-till significantly ups ag land prices on farmland in the Midwestern U.S.

"This suggests counties with higher no-till adoption rates also likely experience higher growth in farmland values," they write. "Our study, which examined USDA Census of Agriculture county reports of land values over 12 Midwestern U.S. states for census years 2007, 2012 and 2017, along with Iowa State University's Farmland Values Survey results from 2005-2016, shows a 1%

increase in the adoption rate of no-till can lead to a $7.86 per acre increase in land values.

"Using only the Iowa county data, the study indicates a 1% increase in the adoption of no-till can increase county-level farmland values by $14.75 per acre," they write.

The paper's authors say the results show statistically significant improvements in land values for no-till adoption ranging from $6.65 to $12.59 per acre based on the census-based data, and from $14.75 to $24.12 for county-level values based on the ISU data.

"These results indicate potential soil health improvements through no-till *(and other practices such as cover crops, rotations, buffer strips, ponds and sediment basins and integrated pest management)* are likely to generate additional benefits to landowners through higher land values," researchers write.

Current estimates peg no-till adoption at about 37% of cash crop acres. While cover crop adoption is expanding rapidly each year, total acres under cover crops still account for only 10% of commodity acreage, according to USDA-Economic Research Service figures reported in 2019.

Much work remains to see further gains in conservation-centered agriculture. In addition to farmers themselves, studies show landowners will play an increasingly important role in boosting the number of acres involved in developing conservation concerns.

Bridging the Gap

A recent survey by the American Farmland Trust (AFT) shed interesting light on NOLs and their attitudes toward environmental issues on farm land.

In a 13-state survey conducted between 2018 and 2020 AFT polled NOLs to discover:

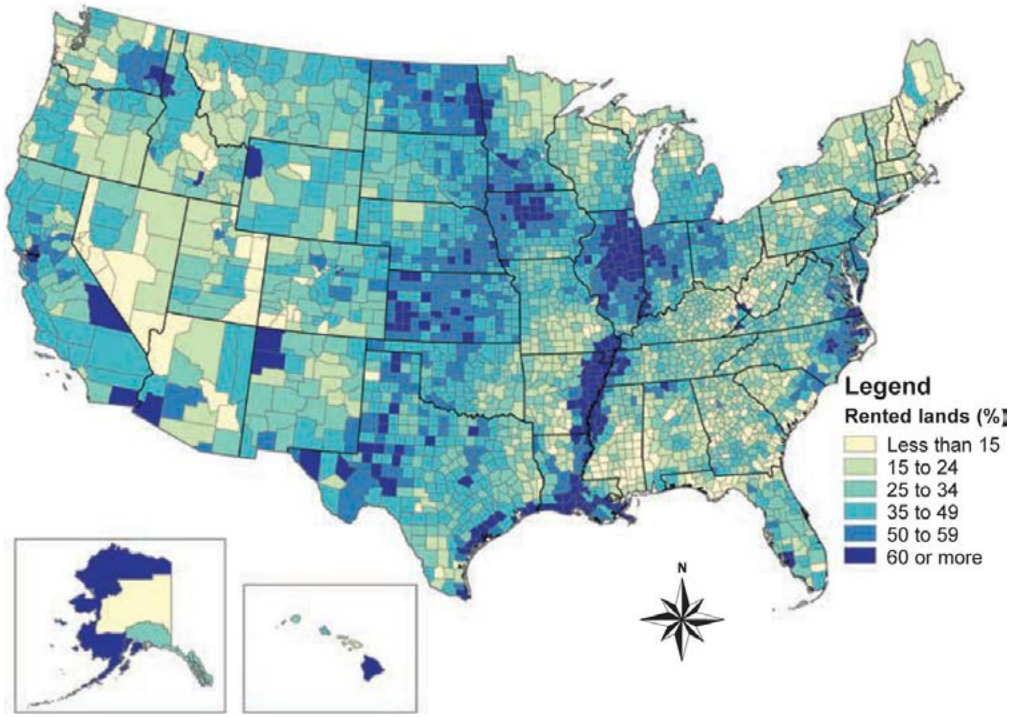
- Their familiarity with farming and support for conservation.
- Ways to overcome barriers to conservation management decision-making and implementation.
- Effective ways to increase communication between NOLs and their renters concerning land stewardship and adopting conservation measures.

"While our study focused primarily on states with the largest acreages of rented land (Figure 2), we also factored in samples from various USDA production regions," says Jean Brokish, AFT's Midwest deputy director.

The results increased understanding of NOLs and challenged some long-held stereotypes, including:

- They care only about the financial bottom line.
- They do not care about the land.

Concentrations of Rented Farmland in the US



RENTAL DENSITY. This map shows the percentage of rented farmland per county according to the 2017 USDA NASS Agricultural Census. Heavy concentrations of rental properties are visible in the Corn Belt states.

Brokish says several factors emerged as more important to NOLs than financial considerations, including preserving farmland and conservation concerns.

"In fact, the findings strongly indicate NOLs are supportive of their renters taking conservation-oriented actions on the land and are willing to extend leases to provide time for conservation practices to become effective. Also, they showed interest in making suggestions to renters concerning certain conservation practices and a willingness to enter into amended lease agreements or signing addendums to require those practices," she explains.

The study also revealed NOLs who have no farming experience are the group least involved in conservation programs and the most likely to indicate they have no knowledge if conservation programs are being applied on their land. While both male and female NOLs indicated interest in conservation, results show female NOLs are twice as likely to say they did not know about involvment in any of the conservation practices or if they had received conservation technical assistance from USDA.

"In the long-run, net returns should be shared in an equitable manner between landowners and tenants..."

– Michael Langemeier, Purdue University

AFT's research report says such findings may explain why many farm operators indicate they have difficulty communicating with NOLs.

Barry Fisher of Fisher Soil Health in Greencastle, Ind., understands this difficulty, looking back on his career with USDA-NRCS advocating for soil conservation and protection of agricultural lands.

"This seeming disconnect between NOLs and farm operators is why it is vital for landowners to be aware of how their tenants farm," he says. "The value of the land, and the return on farming enterprises — which directly or indirectly affect the landowner — depend on how well the land is cared for over the long-term. Before lease and rental agreements for farmland are signed, it's important to have these discussions."

The Auburn-Iowa State study concludes that while more than half of landowners, which own 57% of Iowa's farmland, say they are open to increasing cover crop acreage on their land over the next 5 years — and are willing to help defray part of establishment costs — results show reasons respondents give for not having cover crops on their land differs between operators and NOLs.

"This suggests it is important for land-grant universities to provide more research-based extension services targeting NOLs to reduce the perception gap," says principal author Wendiam P.M. Sawadgo of Auburn. "Resistance to cover crop use as a management tool to protect the soil from erosion and improve soil health comes largely from the expense of establishing a crop that pays no immediate return in the sale of a harvest, despite evidence of long-term advantages in field productivity where cover crops are used in rotation."

Flexibility is key, says Michael Langemeier of Purdue University's Center for Commercial Agriculture.

"It is important to consider economic factors when creating a lease supplement concerning conservation practices and improvements," he says. "Crop leases need to provide a business framework that encourages the use of new technology, in addition to maintaining and improving soil health.

"In the long-run, net returns should be shared in an equitable manner between landowners and tenants, and rent adjustments need to be made in situations where the operator or tenant incurs costs related to any given practice or improvement.

"Finally, good communication between operators and landowners is essential. Landowners should discuss potential practices with the operator, instead of simply insisting that certain practices be used."

Capitalize on Conservation with Funding Programs

Whether via the government, carbon markets or companies, opportunities abound to help no-tillers employ regenerative ag profitably.

By Laura Barrera, Contributing Writer

Most growers don't realize just how many opportunities there are to fund new conservation practices.

That's what Jared Knock has learned in his work as the lead of business development for Millborn Seeds, a cover crop and specialty seed company. A no-tiller and rancher himself, he often helps other farmers understand what cost-share incentive programs are available to fund conservation practices.

And there are plenty of opportunities — Knock identified 19 programs just in South Dakota that financially support farmers who grow a perennial crop on degraded farm ground.

Realizing that many farmers were unaware of all the opportunities that exist, he created AgSpire, a business focused on helping connect farmers to companies that want to help the environment.

While the different opportunities and dollar amounts that growers can receive vary throughout the country, Knock shared some nationwide programs no-tillers should consider applying for, his tips for increasing your chances of receiving funding, and how to identify other potential financial sources.

EQIP and CSP

The two programs no-tillers are most likely to be familiar with are the ones funded through the USDA NRCS: Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP). These programs financially support farmers in implementing environmentally beneficial practices, such as cover cropping, micro-irigating or nutrient management.

There are almost 200 conservation practices that farmers can apply to receive funding on, ranging from simple baseline practices to extremely complex.

There are even gradients within the practices. For instance, if a farmer wants to implement a nutrient management plan, that could range from a basic plan with manure to taking grid or zone samples and using variable-rate application.

While EQIP and CSP are very similar — they fund the same practices, have the same application timelines, and even use the same application form — there are a few difference between them. CSP takes a whole-farm approach and the NRCS says it's ideal for growers who have already been doing conservation work and want to expand their efforts. EQIP can be more piecemeal and may be better suited for growers new to conservation practices. Knock says EQIP tends to be better for growers looking to implement infrastructure-related changes, such as fencing and water.

The NRCS has online checklists to help growers decide which program is right available at bit.ly/eqipchecklist and bit.ly/cspchecklist.

How Much Funding You Can Receive

Payment amounts vary by the practices you're implementing, the acreage you're implementing them on, and the state you're located in. The more practices you implement, the more funding you can receive.

For example, let's say an Ohio no-tiller purchases a new farm that has been conventionally tilled and in a corn-soybean rotation, and wants to apply for EQIP to adopt several new practices. If that grower receives funding to implement no-till ($16.22/acre), a conservation crop rotation ($10.39/acre), a basic nutrient management plan ($6.98/acre), precision ag pest management ($46.43/acre), and a basic cover crop ($51.05/acre), they could receive $131.07 per acre under Ohio's 2022 payment rates.

Knock's own EQIP contract lasts for 3 years, which is the most common contract length he sees, but the NRCS says contracts can go up to 10. And farmers can enroll in EQIP multiple times. If you have new land or a new practice you want to implement, you can apply for the pro-gram again.

The NRCS says CSP operates on 5-year contracts and the funding is capped at $40,000 per year and $200,000 during any 5-year period.

Knock notes that you can be funded simultaneously by both CSP and EQIP, but there's no double-dipping. If there's a practice you're committed to under EQIP, you can't also receive funding for it through CSP.

And it's important to note that you can't receive funding for practices you're already doing, unless you're applying them to new land or if you can increase their complexity. For example, a no-tiller cover cropping a single species on a 100-acre field could potentially receive funding for going to a multispecies cover crop mix on that same field. Knock says this often comes down to the discretion of your local NRCS office, because they all have slightly different interpretations of what counts as a new practice.

STACK THE PAYMENTS. No-tillers can maximize the amount of money they receive for a regenerative ag practice, such as cover cropping, by applying for both government and private funding programs. Consider looking into EQIP and CSP, private cost-share opportunities and carbon markets.

Increasing Your Odds for Funding

Funding is not guaranteed. Farmers apply and their applications are ranked, so you're competing against other applicants for funding. The number of applicants accepted and the amount of funding they receive is based on how much funding is available per state.

In general, CSP is more competitive. Knock says a couple of years ago only 10% of CSP applications in South Dakota were accepted compared to 60% of EQIP applications, and that primarily was due to how much funding each program had available.

There are ways to make your application more competitive. With CSP, Knock says you typically get funded if you commit to a bundle of practices, such as minimum-till, minimum three-crop rotation and a nutrient management plan.

Same goes for EQIP — you want to try to address as many resource

concerns as possible.

"The more resource concerns you address, the higher your application is going to rank," he explains. "Some things address multiple resource concerns, like cover crops, while a stream crossing addresses one resource concern."

And you're better off applying for multiple practices. Knock says many growers think they should keep it simple and only ask for funding for cover crops on an 80-acre field, for example. But he says it's very unlikely someone would receive funding for just that.

That's not to say that you need a lot of acres to receive funding.

What No-Tillers Could Receive from EQIP in 2022

Code	340	412	590	528
Practice	Cover Crop, Winterkilled Cover Crop Species	Grassed Waterway, < 35 Foot Top Width	Nutrient Management, Basic Precision	Prescribed Grazing, High Intensity Grazing
Ohio Rate	$33.79/acre	$2,508.29/acre	$42.65/acre	$49.73/acre
Ohio HU Rate	$40.55/acre	$2,947.52/acre	$51.18/acre	$59.67/acre
Iowa Rate	$23.02/acre	$1,459.1/acre	$28.16/acre	$47.18/acre
Iowa HU Rate	$34.54/acre	$2,273.06/acre	$42.24/acre	$56.62/acre
Practice	Cover Crop, No Termination Needed	Waterway Drainage Area 200-600 acres		Prescribed Grazing, Pasture Intensive
Wisconsin Rate	$33.00/acre	$3.68/foot	$42.84/acre	$59.56/acre
Wisconsin HU Rate	$39.6/acre	$4.41/foot	$51.38/acre	$71.47/acre
Practice	Cover Crop, Basic	Waterway with Side Dikes or Checks		Prescribed Grazing, Habitat Management
North Dakota Rate	$20.80/acre	$4,660.98/acre	$33.72/acre	$13.97/acre
North Dakota HU Rate	$38.13/acre	$6,603.05/acre	$47.77/acre	$16.77/acre

PAYMENT POTENTIALS. As shown in these 2022 payment rates for Iowa, Ohio, Wisconsin and North Dakota, what a no-tiller will receive from EQIP depends on the practice, state, year, and whether they're a historically underserved (HU) recipient. While the codes are the same, the definition of each practice can also vary from state to state.

Knock knows farmers who have EQIP contracts for properties as small as 3 acres and others for well over 1,000 acres. It's not about the size of the acreage the practices will be applied across, but what you plan to do. There are funding limitations that vary by state and for certain practices, which also play a role.

In fact, targeting the right practice for a smaller acreage may be what grants you an EQIP contract. Every NRCS district will have certain practices they're prioritizing, so if your application includes that practice, you're more likely to be accepted. For example, let's say you want to convert 1,000 acres to no-till from full tillage, and your state is prioritizing pollinator habitats. If you include a 1-acre pollinator habitat in your application, your odds of being accepted increase significantly, Knock says.

You can find out what the NRCS is prioritizing by reaching out to your local district office or seeing what initiatives are listed on your state's NRCS EQIP website.

Finally, if you're a new farmer, a veteran, socially disadvantaged or have limited resources, check to see if you qualify as a historically underserved (HU) grower. There's a built-in rate pool for these farmers and they generally receive more funding for each practice.

"The more resource concerns you address, the higher your EQIP application is going to rank…"

— Jared Knock, Millborn Seeds

Be Ready to Implement

Farmers should get their applications in by September or October. Knock says you need to be patient and flexible on when you implement the practices you've requested funding for.

"The way the NRCS does their batching, a lot of times they won't come out with their final recommendations until late spring, which sometimes is too late to even do the practice in the year that you're trying to," he explains. "Make sure that you're flexible with implementation, meaning, if I couldn't establish this cover crop this year because I didn't learn about my acceptance of the program until after I planted my primary crop or I put on a pre-emergence herbicide, I'm going to roll that practice adoption into the next year."

And be prepared to do everything on your list. If you don't address all the resource concerns you applied for, you can have your entire funding revoked — including any payments you've already received.

RCPP AFA and Climate-Smart Commodity

RCPP is another program that works through the NRCS. Standing for the Regional Conservation Partnership Program, it works as a co-investor with third-party partners to expand their ability in addressing natural resource concerns.

Under the 2018 Farm Bill, the NRCS can now award up to 15 Alternative Funding Arrangement (AFA) projects annually. This now allows those third-party partners in the RCPP to work directly with farmers, ranchers and private landowners to carry out their projects.

For example, Ducks Unlimited, a non-profit focused on wetland and waterfowl conservation, has an RCPP for the Prairie Pothole Region in the Dakotas and Montana. They were awarded $8.7 million dollars by the NRCS in 2020, and in 2021 began using the AFA framework to work with farmers on implementing NRCS practices.

"Essentially it's like a grant that goes to a nonprofit in which they administer the funds," Knock says. "These programs are funded with

NRCS dollars that happen outside of your NRCS office. Your local NRCS office might be aware of them, but wouldn't actually administer the funds, even though it all comes out of the same Farm Bill allocation."

Because the projects are region-specific, there may not be one available for where you farm. Growers can check recent RCPP press releases to find out who is being funded or visit bit.ly/rcppmaps to view the projects by geographic location.

Another new USDA-funded program is the Climate-Smart Commodities, which is providing $1 billion towards partnerships that support "climate-smart" farmers, ranchers and forest landowners. The purpose is to create market opportunities for farmers who are using practices that sequester carbon or reduce greenhouse gas emissions.

Like the RCPP AFA, individual farmers can't apply, but can receive incentives through partners that are funded.

The Climate-Smart Commodities program launched this year, with the first round of recipients announced in September. Growers interested in learning more about the program should visit usda.gov/climate-solutions.

"They need to see that the dollars spent on buying a carbon offset led to a new change, not paying for something existing…"

— Jared Knock, Millborn Seeds

Privately Funded Programs

Government-funded programs aren't the only opportunities available to no-tillers. Knock says there are many private programs outside of the NRCS that are changing the dynamic for conservation funding.

There are several companies that are working to source sustainable ingredients and rewarding farmers for doing so. For example, through a partnership with Practical Farmers of Iowa (PFI), growers in the state can participate in a cover crop cost-share program if they sell their corn or soybeans to a partnered buyer. The cost-share currently offers $10 per acre on either 10% of farmed acres or up to 200 acres, whichever is larger. After that, it's $5 per acre.

Private programs also create the potential to receive additional funding for practices for which you may already be receiving government funding. The PFI cost-share program currently allows farmers to participate on acres that are also participating in state programs, but they're not allowed to include land that is already enrolled in another private cost-share program. Knock stresses that farmers should always double-check with the private funder to make sure that land under a government contract can still be used in their programs.

The challenge with private programs is knowing what's out there. Knock recommends checking out PFI to see which companies are offering cost-share programs, but adds that AgSpire is launching a platform that will further help farmers explore all the different options and see what they're eligible for.

Carbon Markets

The one private funding opportunity every no-tiller has probably heard of are carbon markets. There are already a number of these programs available with new ones continuing to emerge.

Knock's first piece of advice for no-tillers interested in joining a carbon program is to make sure they trust the organization with their information. Because not only are farmers selling carbon cred-

its, they're also selling their data to help companies build up the models to understand how much carbon is offset through different regenerative ag practices.

"You need to be very conscious of the fact that you're going to be offering them a lot of information," he says. "If you don't like that, then don't do it."

Second, no-tillers should know there are differences in contract lengths. Some have very long-term commitments, while others offer shorter ones. Knock says the longer length contracts tend to be more holistic, as in you're going to get better data.

"But there are some good short-term, 1-year contract programs available," he adds. "So if it's not something you're sold on, do a short-term contract instead."

Finally, like the government-funded programs, growers cannot be rewarded for carbon-sequestering practices they're already doing, such as no-tilling and cover cropping.

That's because the carbon markets have to be approved by a verifier. Verra is the most common one, and approves carbon credits based on practices that lead to more carbon sequestration or mitigation of greenhouse gas emissions.

"They need to see that the dollars spent on buying a carbon offset led to a new change, not paying for something existing," Knock says.

This just means that no-tillers will have to find what's called "additionality" — new practices or improvements to existing practices that have a proven track record of capturing carbon or mitigating emissions.

Some examples of additionality could be increasing the number of cover crop species they plant, extending the cover crops' growing period by seeding them earlier or terminating them later and planting green, incorporating livestock grazing or adding to their crop rotation. No-tillers will need to work with the carbon program they're interested in to determine what qualifies.

PRIORITY PRACTICES. The NRCS has certain priority practices that, if included in your EQIP or CSP applications, will improve your odds of receiving funding. For instance, if pollinator habitats are a high priority, committing just 1 acre to that can give an edge over other applicants. Check with local and state NRCS to learn what natural resource concerns it's on addressing.

And just as you could get EQIP and CSP funding for practices you've already been implementing onto new ground, you could enter carbon markets the same way.

"That gives you an institutional advantage that you actually know what you're doing," Knock says. "Be creative with the definition of additionality. And use this as an opportunity to potentially expand your operation."

Women Landowners Arm for Conservation Push

A growing number of women landowners seek a role in land operational decisions, helped by federally funded outreach programs.

By Brian O'Connor, Lead Content Editor

Ruth Rabinowitz had a problem.

The long-time professional wedding photographer inherited hundreds of acres of fertile farmland in Iowa and South Dakota from her deceased father, David Rabinowitz, a Great Depression-era doctor, who invested heavily in Iowa farmland between 1978 and the mid 1990s.

"He didn't believe in the stock market, but he believed in land," she says.

Ruth grew up in Arizona, where she remembered the trappings of her father's land portfolio, including Corn Suitability Rating Reports as a constant presence, and California, where she got her art degree from the University of California, Santa Cruz. She lived in California until last year, when she built a house in Iowa and relocated to be closer to the property.

"In Iowa, 47% of all acres and 55% of leased acres were owned or co-owned by women in 2017…"

After dividing up the purchases of land among family members following her father's death in 2019, Ruth ended up with about 400 acres of working cropland and about 300 acres of Conservation Reserve Program (CRP) land.

The problem wasn't the land. The problem was what to do with it.

Caring for the Land

"I believe we're in a climate crisis," Ruth says. "I had to evacuate my house in California from the huge fires last summer that were 3 miles from my house. I've seen it getting hotter and hotter and drier and drier. The land needs us to take care of it."

Ruth shared her father's convictions about conservation.

She started researching conservation methods to try and find out how best to use the land and, in the process, discovered issues she was unaware of.

"I started walking the farms because my father had medical issues that didn't allow him to walk the farms," she says. "I got out there and realized 'Oh my gosh, there's erosion up to my knees here.'"

She installed two 1-acre ponds on one portion of the farms and obtained an Environmental Quality Incentives Program (EQIP) grant to install 30-foot wildlife corridors around the edges of farm fields. She did timber stand improvements (some of the land includes forestland) with the help of the Iowa Department of Natural Resources. She also began to research land management ideas online.

"I started attending farm conventions, conferences, field days, reading like crazy, watching YouTube videos on cover crops, realizing that we were way behind in the conservation of our ground," she says.

Over the next 7-8 years, she worked to put in 25 grass waterways.

"Rome wasn't built in a day, right?" she says. "You can't do all this in one year."

She started researching no-till farming, strip-till farming and cover crops. She discovered groups, like the Iowa Farmers Union, Practical Farmers of Iowa, Climate Land Leaders and the Women, Food and Agriculture Network (WFAN). After conferences, research and relocation, Ruth made another big move. She met with her existing tenants and spoke with new farmers.

UP TO THE CHALLENGE. After Ruth Rabinowitz inherited management of 700 acres in Iowa and South Dakota in 2019, she faced tough decisions about how to best manage her land with conservation practices.

"It was the first year that I felt confident enough to actually get new farmers out there on many of my farms," she says. "The number one thing as the resumes were coming in for the interviews — because I went to their farms to interview these farmers and look at the machinery and talk face to face — they had to believe in no-till, and it wasn't going to be their first time doing cover crops."

"All my farms are no-till, and they're all going to have cover crops," Ruth adds. "And that's an apex moment for me to be able to tell you that today because that has taken me a decade to get there."

More than half the growers that had worked Ruth's land were replaced. Some growers were willing to change. One farmer was able to make the transition to strip-till. Another grower had already been planting cover crops and performing no-till without being asked.

Ruth is happy with the direction her land is now taking.

"I think that these savvy famers are learning that if they want to retain ground, they need to move with the times," she says. "I would rather charge lower rent and get these things going."

The conservation practices she's mandated are about both ecology and economics.

"I want my land to be alive and thriving," she says. "I want my topsoil to be built and not running away down the ditch."

She was also able to find middle ground between her conservation land ethic and modern farming practices. For example, she built a prohibition on atrazine into her lease over concerns about possible effects to wildlife in local waterways. But the lease also contains a list of acceptable alternatives.

"That wasn't a hard sell, once they saw the list of things that they could use," she says.

Women Landowners

Ruth's story is both unusual and commonplace.

Commonplace because about half of all farmland in the United States is owned by women. In Iowa, where most of her land is located, 47% of all

acres and 55% of leased acres are owned or co-owned by women, according to Iowa State University extension and outreach staffers. Most owners are age 65 or older, and about 13% were 80 or over in 2017.

Those statistics can shock even those who work in the field, like Jean Eells. She completed a Ph.D dissertation on the subject after learning, as a county water health commissioner, that women owned half of the farmland in Iowa. Eells now works as a private contractor for WFAN and other female-landowner focused groups.

"You could have knocked me over with a feather," she says. "Most people that learn that are just dumbfounded because we don't see the presence of women landowners in particular."

Ruth's active participation in the decision-making process is unusual, going by Eells' research. She says a number of factors contribute to less visibility for female landowners.

"We're very, very invisible," Eells says. "Some of it can be by design and some of it is just an omission. We haven't thought about how important it is

How Landowners Can Talk to Growers About No-Till.

During work for this story, we collected tips from landowners about how operators can broach the idea of conservation agriculture.

Landowners approach the issue with an eye toward retaining land value. Operators are frequently connected to yields, and may have a more short-term focus on turning a profit. However, landowners agreed that the reverse can also be true: landowners may hesitate to endorse or support practices that are less widely adapted by other farmers.

Landowners agreed that the relationship with tenants can be tense, and frequent conversations outside of the discussion about the rent check can help make discussions about practices easier to begin.

Identify Model Growers

Finding a baseline of comparison for the kinds of practices you employ is key, Iowa Landowner Jackie Armstrong says. For one tenant, she spoke for years about conservation practices, up to and including planting prairie on the edges of her fields.

"Then, one day, I mentioned the name of another person in our community" who employed conservation practices, she says. "And his eyes brightened, and he said 'Oh, my dad knows him.'"

"That was the way to get the conversation started, because he wasn't listening to Jackie Armstrong, this somewhat tiresome lady who thinks she's trying to tell a lifetime farmer how to do his job," she adds.

Confront Assumptions

Jean Eells is a researcher into issues of gender and landownership in Iowa, but she's also a landowner. She's familiar with research at Iowa State showing growers are unwilling to even broach the subject with landowners.

"Of the farmers they had interviewed, to a one, they were not going to bring up cover crops, no-till or conservation practices to their landowner because they were afraid they were going to lose the land," she says. "They really need to confront their assumptions about what their landowners will or won't do."

Reluctance also stems from the fact that if they bring it up, they'll be required to do it when they can't afford it, Eells says.

More communication outside of the context of the rent check is key, Eells says.

"Start having more conversations with your landowner during the year," she says.

Examples can include monthly check-ins via text about what work is being done on the property, or a simple photo taken with a cell phone, Eells says.

"Just increase the amount of communication period," she says.

This can be particularly valuable for female landowners, who generally place a high premium on family retention of land, social, cultural and communitarian uses, Eells says.

Be Flexible

Armstrong also worked with her tenants to establish contracts that help split costs.

Eells says she's heard of landlords not charging on plots used for conservation agriculture, for example.

She and her tenant had committed to roller-crimping cover crops for a season, and had identified roller-crimpers to rent. However, when the time came, both disappeared. After frantically trying to find a replacement option, Eells decided to bite the bullet.

"Once I realized that a roller-crimper isn't hugely expensive, I bought one," she says. "If I hadn't been already involved in the conversations with my farmer, I might have just sat there and thought, 'Well, he's going to solve it all.'"

to show ordinary women making conservation decisions."

In addition, contemporary agriculture practices change fast. Growers have traditionally been given a free hand to manage rented properties, which can make new landowners hesitant to address agricultural practices.

"You don't know what's going on," Eells says. "So even if you grew up on the farm, all you've got to lean on are the social norms about what a landowner does or doesn't do."

Growers often play an active role in the decision-making about management choices but focusing exclusively on them overlooks the potential role that landlords can play, Eells says.

"We don't necessarily train our conservation professionals to think about and address that landowner relationship in a broad way," she says.

One engagement method is learning circles, designed to remove the innate hierarchy of the classroom and replace it with a more equitable structure based on social relationships.

A one-day meeting of this type among women landowners can result in a 70% action rate for participants, Eells says.

"It's just like turning the light on," she says.

Further Outreach

WFAN received $402,040 of about $22.5 million awarded as part of the USDA's 2021 Conservation Innovation Grants program. WFAN primarily works with landowners in Iowa, but the grant includes outreach to landowners in Illinois, Kansas, Minnesota, the Dakotas, Nebraska and Wisconsin. In early 2021, the Iowa extension launched an outreach specifically targeting female landowners. The American Farmland Trust has also focused on female landowners.

CONSERVATION MINDED. After inheriting farmland, Ruth Rabinowitz was determined to make sure her land was managed according to her and her father's convictions about conservation. Among other things, she put in 25 grass waterways and made sure all her tenants were practicing no-till.

The group's primary focus is helping women landowners become more visible about decisions made about land they own, says Wren Almitra, the group's programs and grants director.

"There's a lot of assumptions that women don't even care about these issues," she says. "I think that there's just been a broad range of different ways that women have really been underserved and under-represented because of it."

While conservation agriculture cuts across gender boundaries, portions of the agriculture market remain very male-dominated. While Almita — and every woman interviewed for this piece — say gender isn't automatically grounds for conflict, it can be.

"We hear time and time again from women landowners that we work with that 'I walk into the office, and they ask where my husband is,' or 'I walk in with my husband or father, and they look at them first and I get talked over,'" Almita says. "Or the horror stories of women whose husbands pass away, and the next day somebody is knocking on their door saying 'Hey, are you going to sell the farm to me?'"

To some growers, Ruth's story may sound like the worst-case scenario. However, Eells and others see women landowners' contributions as part of a long-term solution with large stakes for culture, the environment, and finance.

"We're talking $112 billion that people are ignoring," she says. "Talk to us."

Crop Residue Promotes Higher Soil Organic Matter

While increasing organic matter is a multi-year process, no-tillers can accelerate it by ensuring there's enough plant material to replenish what's already in the soil and adding more residue.

By Laura Barrera, Contributing Writer

Despite making up only a small percentage of the soil — no more than 10%, according to the University of New Hampshire Cooperative Extension — organic matter plays a critical role in the soil's health and the crops raised on it.

Doug Miller, agronomist and vice president of Erie, Ill.-based Midwest Bio-Tech, explains just why soil organic matter is so important, the factors that influence its formation and how no-tillers can help their levels climb higher.

Nutrient Release

One of the primary benefits of soil organic matter is its ability to hold onto nutrients.

Miller explains that 1% of organic matter contains about 1,000 pounds of nitrogen (N) per acre. However, only 2% of that N is converted by soil microbes to a plant-available form, which means only 20 pounds of N is available to the crop. So for a no-tiller with 3% organic matter, they can count on about 60 pounds of plant-available N, Miller says.

"People who have higher organic matter soils can have almost enough N available to produce the next crop," he says.

Miller notes that 95% of N in the soil is held by the organic matter, while 90% of sulfur and 40% of phosphorus come from it.

"As you increase soil organic matter, you're going to make more of those nutrients available," he says. "If you lose organic matter, those are lost nutrient sources you're going to have to replace in other ways."

Water Saver

In addition to holding nutrients, organic matter plays an important role in a soil's water-holding capacity.

Miller explains that organic matter is made up of four compo-

nents: active organic material, stable organic material, fresh residue and microbial and biological life.

Also referred to as humus, the stable organic material consists of large molecules, mostly lignin, that are difficult to decompose. It was created by residues from crops raised decades or even centuries ago.

"It's a long stable process, and it's that key component that really contributes the most to the benefits of having soil organic matter," Miller says.

One of those benefits is its ability to hold six times its weight in water. If a no-tiller has 1% soil organic matter in the top 6 inches, that's about 25,000 gallons of water per acre, Miller says.

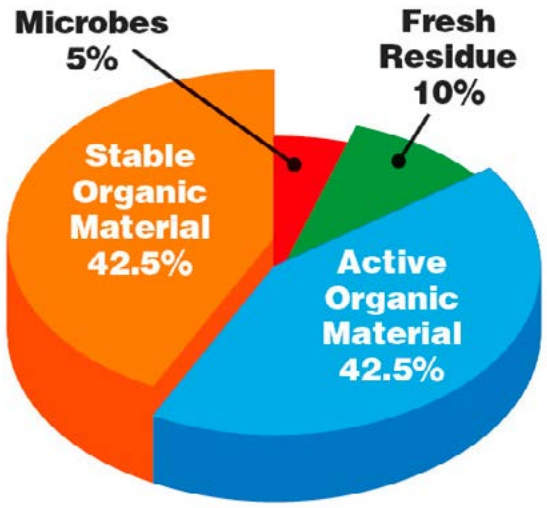
"If we just focus on that top 6 inches, you're going to get about 1 inch of water per 1% of soil organic matter," he says.

In a drought situation, organic matter could make or break yield. Miller says he's seen yield advantages estimated as high as 40 bushels for corn by having an extra inch of water available.

"Most corn plants at the peak of the season are using about ¼ inch of water a day," he says. "If you can keep that corn plant going by providing an additional inch or so of moisture at a key phase like tasseling, you might easily make up more than 10 or 12 bushels per acre."

Miller adds that the carbon compounds released by organic matter act like glue that bind soil participles together, which help to form aggregates in the soil, allowing more space for water to infiltrate.

Four Components of Soil Organic Matter



SMALL ROLE, BIG IMPACT. It may be the smallest component that makes up organic matter, but Doug Miller says microbes still play a crucial role. The vice president of Midwest Bio-Tech says they work to decay fresh residue, recycle nutrients to the next crop, return the carbon to the soil and help build soil structure.

"The soil structure formation process depends critically on having soil organic matter and residue decay to help provide these glues that keep the soil together," Miller explains.

Additional benefits to organic matter include feeding the soil microbial population and buffering soil pH, which helps keep soil chemistry a little more stable, Miller says.

Preserve and Maintain

To increase organic matter, the first step is to protect what the soil already has, he says. That means preventing erosion, as soil disturbance can release up to 20% of organic matter as carbon dioxide.

It's also important to ensure there's enough fresh residue and a microbial population that can break the residue down.

"If you're short on either one, then your system is not going to operate at a very high capacity and you'll probably deplete organic matter," Miller says.

This can occur from making high applications of the wrong fertilizers and pesticides, soil compaction, removing residue or only growing crops that produce fairly small amounts of residue.

Formation Factors

Even if a no-tiller has the right components to build organic matter, there are a lot of factors that influence the formation of it. The first one is climate.

"Warmer, moister climates tend to have more vegetation and fast

decay," he says. "If you increase the temperature by about 10 F, you're going to roughly double the amount of microbial activity."

Conditions that are too dry, or too cool and wet, will slow down residue decay.

Soil type is another factor. Miller says clay particles tend to bond onto some of the stable material in organic matter and preserve them.

"Once you start to form clay colloids or aggregates, you'll get soil organic matter trapped in and that basically preserves it. Microbes can't get to them," he explains, which is why clay soils tend to have higher organic matter naturally.

On the other hand, it can be a challenge to build up soil organic matter in sandy soils. Miller says it's hard to find sand that has an organic matter higher than 2%.

"Typically sands decay residue faster than clays because you don't have that bonding capacity to preserve it, and there's more air flow through a sandy soil that helps the residue decay faster," he says.

However, without that bonding capacity, the microbes don't have access to the N they need like they do in clay soils. They also don't have the water-holding capacity as clay soils do.

"If you're limited on water and you get a dry, sandy soil, you're not going to have any residue decay because the microbes can't react," Miller says.

The third factor in organic matter formation is vegetation. Miller says growers in the Midwest are blessed with higher organic matter in their soils, thanks to the prairie grasses that used to be there.

"People who have higher organic-matter soils can have almost enough nitrogen available to produce the next crop…"

"You go back to the time before they were settled and tilled, those prairie grasses had very deep root systems, 7-8 feet or more," he says. "Vegetation was 6, 7, 8 feet or more in height. That was regenerated each year."

Finally, soil disturbance also plays a big role in organic matter formation. Miller says a conventionally tilled soil will maintain organic matter around 1%.

But on a continuous no-tilled soil, there will be twice as much organic matter in the top 2 inches compared to a conventionally tilled soil. At the 4- to 6-inch depth, the amount of organic matter will be comparable in both systems.

One Percent

With the various factors that go into forming organic matter, trying to increase the amount in the soil by even 1% is a process that may take several years.

Miller says to add 1% requires about 10 tons of material added back into the soil. A corn crop might have 10-12 tons of residue per acre, including the roots.

But only 40% of the residue is organic carbon, so growers can count on less than half of their residue being available for the microbes.

"Then once it's decayed, somewhere between two thirds and up to 85% of that carbon is lost as carbon dioxide," Miller adds. "Only about 15-35% of that carbon will be captured for entry into the soil organic matter."

Therefore, only about 10-20% of residue can be turned into organic matter. Miller says on a percentage base, that's 0.125-0.25% of organic

matter per year.

"It's going to take about 4-8 years to increase that soil organic matter," Miller says. "Unless you can add additional residues, cover crops, manure, or you're in a double-cropping situation. Anything that adds additional residue is going to help."

The other consideration to keep in mind is that about 3% of carbon will be lost every year from natural degradation. It's about 10 tons of carbon per 1% of organic matter, so if a no-tiller has 3% organic matter, he's losing about 1 ton of carbon per year.

"You're going to have to replace that back as well," Miller says. "What was a 4- to 8-year process ends up being somewhere between a 5- and 20-year process."

He notes that the maximum amount of organic matter a no-tiller can expect to build in a year is 0.5%.

"What was a 4- to 8-year process ends up being somewhere between a 5- and 20-year process..."

Adding Residue, Manure

If a no-tiller wants to try to speed up the soil organic-matter formation process by adding more residue, then there are a couple things to keep in mind.

The first is that not all residues are the same. Miller says that they all have about 40% carbon per ton, but their ability to break down depends on whether it's above or below ground.

"Above ground stuff typically is going to break down faster," he explains. "The reason the root system breaks down slower is it's composed of a higher fraction of lignin."

The carbon-to-N ratio also matters, Miller says. While the microbes are after the carbon, they need N to build proteins, amino acids and other essential chemicals, so residues that have more N relative to carbon, such as legumes, are more favorable for microbial decay.

Growers using cover crops to build organic matter will likely get more out of their roots than what's grown above ground.

Miller says the amount depends on when the cover crop is terminated, how heavily it was seeded and how well it established in the fall.

"For a really successful annual ryegrass stand or some of the other lush cover crops that develop fairly deep root systems, you might have 1-1½ tons of residue just in the roots," Miller says. "That will help."

No-tillers can also use manure to help build soil organic matter, but it will take longer than crop residue, as there's only about 20% carbon in manure.

"It's about as half as much as crop residue, which means it's going to take roughly twice as much manure to have the same impact on soil organic matter," Miller says.

That amount is also influenced by the animal's age, feed, and bedding. Solid manures are generally better than liquid because they don't contain additional water content, Miller says.

It's also important to keep in mind that no-tillers removing residue for livestock will need to replenish it to maintain organic matter.

For example, in a silage situation a grower needs to apply 15-20 tons of solid dairy manure per acre to get enough carbon back into the soil to maintain the current organic matter levels.

7 Critical Questions to Ask Potential Farmer Tenants

How to tell if your tenant shares a conservation approach to land management.

By Dan Crummett, Contributing Writer

Regardless of their age, landowners leasing land to farmers and ranchers need to view their properties as an asset much like a retirement account and heed investment advice that says: "If you're spending down your principal, you're likely to run out of money."

Barry Fisher, a long-time soil health expert for USDA-NRCS, and now owner of Fisher Soil Health in Greencastle, Ind., says the "principal" is the overall long-term productivity of the land. How that land is farmed is vital to maintaining its value, he says.

"In recent years farm experience and research has shown improving soil health by reducing or eliminating tillage, incorporating cover crops into a diverse rotation plan and reducing chemical inputs can actually rebuild soils depleted through years of conventional farming," he says.

Landowners need to be aware of how their tenants farm, and why, then cultivate growers whose practices best align with the long-term goal of maintaining and growing the "principal" of productive soils.

Fisher says landowners can make better informed choices on who farms their property — and how well they are likely to steward it — by asking the following questions of prospective tenants before signing rental or lease agreements:

1 Do you farm to build organic matter in the soil?

Organic matter (carbon) levels are one of the most important indicators of a farm's productivity. The amount of soil organic matter many times is crucial to how much a tenant will pay to rent or buy land. Finding a grower interested in building organic matter through practices such as no-till and cover crops is like finding better rates of return on a personal investment account.

2 Do you test the soil at least once every 4 years?

Maintaining fertility and pH levels are critical for optimum farm productivity. Regular soil testing can show trends in soil fertility, pH and organic matter levels in various areas of each field and determine the amount of crop nutrients needed. If a farm has a history of manure application and very high fertility, a tenant could save money by planting cover crops to keep those nutrients in place, rather than applying more fertilizer that may not be needed.

3 Do you no-till?

While fresh "clean-tilled" fields in the spring look nice to many landowners, that nice look is short-lived and leaves the field vulnerable to wind and water-runoff erosion, along with a loss of organic matter. Crop residue or a growing cover crop on the surface provides armor for the soil and protection from wind, heat and rain. It increases the soil's ability to absorb precipitation. In addition to reducing erosion, the plant material on the surface conserves moisture for the crop and provides a protective blanket to reduce intense summer field temperatures and the resulting burn-off of CO2 (carbon).

4 Do you use cover crops?

Cover crops provide a green, protective blanket through the winter months. The green-growing covers collect solar energy and provide habitat for a diverse population of wildlife above and below the soil surface during a time when the soil would otherwise be lifeless and barren. As new life emerges, cover crops secure nutrients left behind by the previous crop and release them for use by the next crop. The sun's energy harvested by these plants fuels photosynthesis, which takes CO2 from the atmosphere to produce food for the plants and microbes near their roots, while at the same time releasing clean oxygen to the air and depositing organic matter in the soil.

5 Do you use integrated nutrient, weed and pest management practices?

20 years of research has shown over-use of chemical crop protectants can have negative effects on soil biology similar to those of physical disturbance froconventional tillage. Growers using integrated pest management practices — employing beneficial insect and microbial populations along with judicious chemical controls — can achieve effective crop protection without making expensive and unnecessary "insurance sprays."

6 What other conservation practices do you use to reduce soil loss?

Establishing and maintaining erosion control measures such as grassed waterways, terraces and buffer strips provide effective tools to prevent soil loss and control runoff of plant nutrients and crop protectants. While removing land from production in specific areas, grassed waterways and buffer strips can add efficiency and overall productivity to a farm field by removing less-productive land from that being planted and fertilized. Buffer strips can reduce runoff in areas that might be more difficult to farm as well as provide for valuable wildlife habitat. The use of land with less-than-optimum productivity for beneficial insect and pollinator habitat also maintains cover on land more likely to erode.

"Eliminating tillage, incorporating cover crops into a diverse rotation plan and reducing chemical inputs can actually rebuild soils..."

7 What can we do together to improve soil health on my land?

To improve soil health, landowners and tenants both have to take a long-term view of their business. The duration of lease agreements is probably the most critical matter in ensuring farmed land is managed to improve its productivity from year to year.

Growers can build the productivity and resiliency of their landowner's soil, but it likely will take several years to realize the full benefits of doing so. As an incentive for stewardship, landowners are encouraged to consider multiple-year leases to provide security for the tenant.

Longer tenures and flexible leases, which allow the landowner and tenant to mutually benefit from sustainable conservation practices, provide incentives for both parties to improve soil productivity and realize long-term production gains and profitability.

Farmland Rental: Check Your Options to Fit Mutual Needs

How to hammer out the fine print to include no-till, conservation ag and cover crops

By Dan Crummett, Contributing Writer

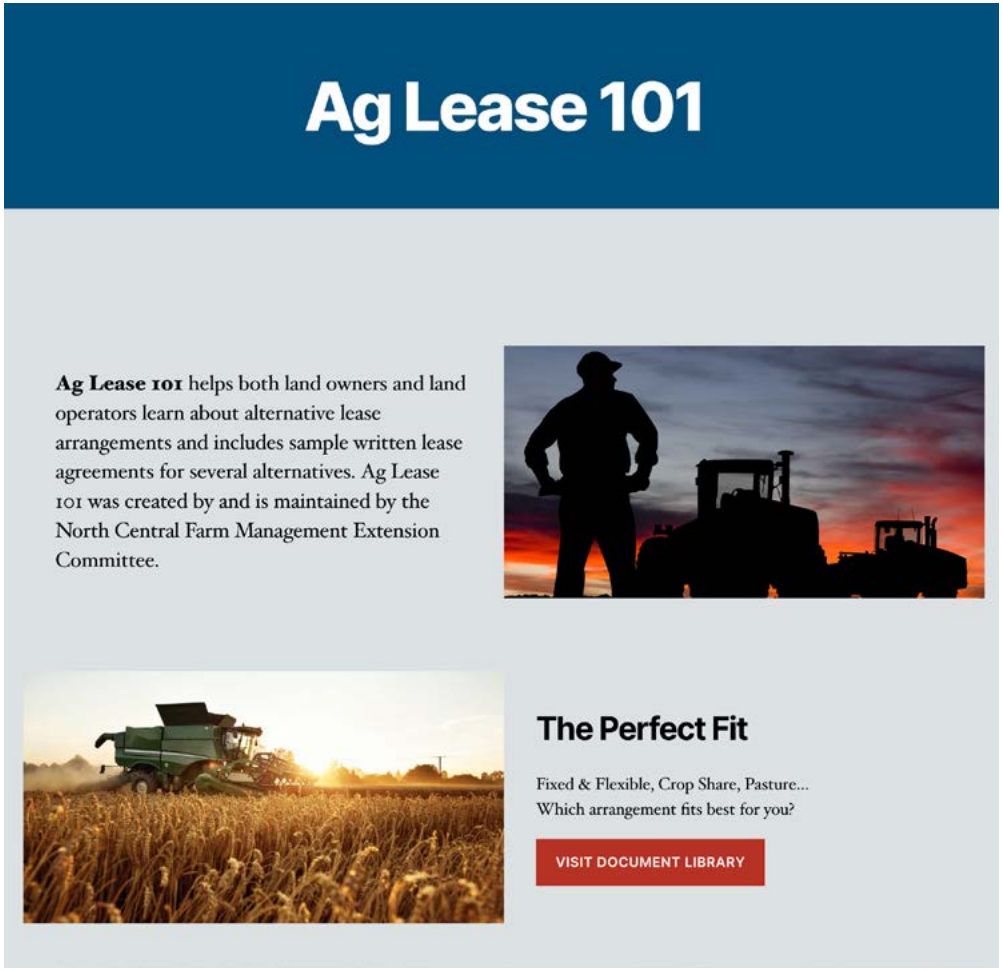
Over the years, two basic rental arrangements have evolved as active farmers seek to increase the size of their operation without the long-term cost of financing and buying more land. Cash rental and crop share cover the majority of arrangements, but to describe the reality of how farmers and landowners actually conduct business as "either/or one-or-the-other" would be a gross simplification.

To examine the two main types of farmland rental arrangements and their long list of variables, we consulted materials provided by the North Central Farm Management Extension Committee, a group of ag economists and extension personnel from 13 land-grant universities located in the Midwestern U.S. and the Great Plains from Oklahoma to North Dakota. In its AgLease 101 program, the committee offers a brief description of the options and their advantages and disadvantages — to both prospective tenants and landowners — as follows:

Cash Rental Arrangements

Landowner Advantages:

- Little to no managerial input is required.
- Reduced involvement in management reduces controversy between parties.
- No concern over accurate division of crops and expenses.
- Reduces landowner's concern over prices and yields.
- Income under the lease does not trigger self-employment tax and



The Ag Lease 101 website includes samples of various lease agreements, worksheets to calculate rates and forms for flex-leasing calculations.

does not reduce Social Security benefits in retirement.

- Reduced paperwork stemming from landowner not required to complete crop insurance and Farm Service Agency (FSA) obligations.

Landowner Disadvantages:

- Cash rental rate acceptable to landowner and tenant can be difficult to determine.
- Once rate is set, changes in that rate may be difficult to negotiate when prices or costs change.
- In average or above-average years, the landowner may receive less net income than from crop-share rent.
- Fewer opportunities for income tax management, ie. timing of cash reporting of taxable income, and purchase of inputs for coming growing season can be made in closing months of tax year to reduce taxable income.
- Increased possibility the tenant will not maintain fertility or condition of the land with a short-term lease.
- Little opportunity for pre-retirement landowners to build base for Social Security payments because of difficulty in establishing acceptable evidence of material participation in operation.
- Difficulty in valuation of farmland at its use value rather than fair market value for estate planning purposes.
- Financial risk of operator non-payment unless steps are taken to reduce this risk such as recording written lease at the proper local government authority, or requiring all or a portion of the rent to be paid in advance.

Operator Advantages:

- Relatively free hand in making management decisions.
- Potential for controversy between tenant operator and landowner is minimized.
- Operator has more incentive to strive for high yields.
- No need to divide crops or income from sale of crops nor keep special records on expenses for landowner required under crop-share arrangements.
- Less capital is tied up in land asset compared with land ownership.

Operator Disadvantages:

- Increased risk from price and yield variations. Cash rent is a fixed cash expense that may be difficult to pay in a poor crop year or when commodity prices dip unexpectedly.
- Increased risk of losing land base that may be critical to financial security of operator's farm business.
- Cash rental rates tend to trend upward as crop yields increase, even though most yield increases may be the result of managerial skills.
- Operator must supply all operating capital for crop inputs, as well as payment of any cash rent due in advance.
- No USDA payment limitation is created for the landowner (vs. a crop share lease), possibly reducing the overall value of payments that may be received by the operator and landowner combined.

Economists agree numerous factors affect cash rental rates, but supply and demand ultimately determine rates for each agreement, with the expected return from producing crops being the overriding factor. In each case, however, several methods exist to help establish a mutually acceptable rental rate. Consider the following examples:

- Cash-rent market approach — This method requires knowledge of cash rents being paid for farms in the area and assumes rents reflect negotiations between informed landowners and knowledgeable operators.
- Landowner's ownership cost — In this approach the landowner calculates the cost of owning the land considering its fair-market value as farmland, interest on the land, real estate taxes, etc.

- Landowner's adjusted net-share rent — This method assumes the rent value should be comparable to the net return a landowner receives under a crop-share lease.
- Operator's net return to land — This considers how much money will be available to pay for the use of land after variable expenses, fixed costs on machinery and a return to labor and management have been deducted from the gross value of crops.
- Percent of land value — This method considers the value of the land against comparable investments held for a similar time period. With this arrangement the landowner's primary risk is falling land values, while the operator faces the risk of yield variability, market prices and the cost of inputs.
- Percent of gross revenue — This method sets a rental rate based on a fixed percentage of the expected gross revenue produced on rented land. Such an agreement is similar to share renting except the landowner has no share in the crop to store and market, nor pay any input costs.
- Dollars per bushel of production — In this case rent is based on a fixed value per bushel. The rate may be based on the dominant crop and applied to all acres, or may be based on all crops produced. If this arrangement uses actual yields, it becomes variable rent from year to year.

Negotiations to find an equitable cash rent can use more than one of the methods outlined, but both parties should bring accurate calculations to the table. Worksheets for each of the above-mentioned methods are available online at www.aglease101.org.

Adding Flexibility

Because farm commodity prices, yields and operating expenses are often uncertain, many landowners and operators opt for so-called "flexible cash rental" agreements in which the landowner can share in additional income from unexpected increases in crop prices in return for lower cash rent expenses for the operator.

The committee cites the following methods of flexing cash rent:

- Flexing for crop price only — This method includes several options for calculation but can substantially increase risk for the operator if low-yielding crops lead to higher prices and subsequently higher rents.
- Flexing for yield only — This method is often used in areas where crops are fed to livestock and no relevant market price exists. Such a lease would be based solely on actual yields achieved.
- Flexing for price and yield — The most popular flexible cash-rent leases take into account year-to-year variations in both price and yield. This method requires the operator and landowner to agree on a base cash rent tied to a base average or expected yield and a base expected price for each commodity grown.
- Flexing based on changes in cost of inputs — Incorporating a factor in a lease agreement that reflects a ratio of the base year's cost of inputs divided by the current year's cost of inputs can help stabilize the bottom line for operators. These costs should be expressed in dollars per acre rather than price due to the difference in the level of use of different inputs.

If a flexible cash-rent agreement is used, the Committee recommends details of how the rent will be determined be clearly specified in a written agreement, including one or two examples with different prices and yields. (Examples of these agreements are available at www.aglease101.org.)

Crop Share Rental Arrangements

As their name suggests, crop-share arrangements find landowner and operator sharing in both expenses and income from crop production. Specific terms of crop-share percentages will vary considerably across geographical areas and should be negotiated on a case-by-case, year-by-year basis.

As with any business management protocol, crop-share rental agreements carry both advantages and disadvantages which need to

be considered. They include:

Advantages:

- Compared with cash rents, less operating capital may be committed by the operator since the landowner is sharing costs.
- Management between landowner and operator may be shared, resulting in more effective decision making.
- Sales of crops may be timed for tax management purposes.
- Risks due to low yields or prices, as well as profits from high yields or prices, are shared between both parties.
- A crop share lease in which the landowner is recognized as providing "material participation" through involvement in crop production and marketing enables the landowner to receive positive federal estate tax considerations. Since crop share income is subject to self-employment tax, it allows the landowner to build a Social Security base.

Disadvantages:

- Landowner's income will be variable because of price and yield variations.
- Accounting for shared expenses must be maintained, along with increased paperwork and record-keeping associated with government payment programs.
- Landowner may have marketing decision responsibility.
- Greater need for landowner and operator discussions and communication.
- Changes in farm technology can mean frequent reviews of the lease agreement are necessary to maintain an equitable sharing agreement for both parties.

Because market-based payments to each party are the basis for crop-share leases, the following basic rules should be followed in formulating such agreements:

- Variable expenses that increase yields should be shared in the same percentage as the crop is shared.
- Share arrangements should be adjusted to reflect the effect new technologies have on relative costs shared by the participants.
- Landowners and operators should share total returns in the same proportion as they contribute resources.
- Operators should be compensated at the termination of the lease for any undepreciated balance of long-term investments they have made.
- Open, honest communication should be maintained between the parties throughout the term of the lease.

Get It In Writing

Economists involved in the Ag Lease 101 project emphasize regardless of what type of lease arrangement growers and landowners enter into, whether it be various forms of cash rent or crop share, the importance of having a mutually acceptable written lease agreement cannot be over stated.

Advantages of a formal, written lease agreement includes:

- Provides a detailed statement of the agreement that assures both parties with a better understanding of the lease terms.
- Record of terms originally agreed upon.
- Provides a guide for heirs if either operator or landowner dies.
- Serves as documentation for tax purposes.

Ag Lease 101 suggests every lease should include:

- Full legal names of parties involved
- An accurate description of the property
- The beginning and ending dates of the agreement
- The amount of rent along with a statement of how and when the rent is to be paid
- The signatures of parties involved.

Sample lease agreements, worksheets to calculate rental rates, and forms for flex-leasing calculations are available at www.aglease101.org.

Starting Points for Landowners Interested in Conservation

Over the course of compiling this report, we came across multiple web resources for moving land into and out of conservation programs. Finding trustworthy, practical information can be difficult, and we offer these resources as a starting point toward more research on how landowners can work with no-tillers to improve environmental conditions, value retention and the bottom line.

WEB RESOURCES

The Agricultural Conservation Easement Program
NRCS.USDA.gov/wps/portal/nrcs/main/national/programs/easements/acep/

Conservation Connect
ConservationConnect.wordpress.com/

The Practical Farmers of Iowa
PracticalFarmers.org/programs/landowners/
PracticalFarmers.org/programs/landowner-coaching

University of Illinois Rental Calculations Document: Computing a Cropland Cash Rental Rate
FarmDocDaily.illinois.edu/2022/09/a-straight-forward-variable-cash-lease-with-revised-parameters.html

Cover Crop Strategies
CoverCropStrategies.com

Clean Water Iowa
static1.squarespace.com/static/586bfd13be65947270902ac5/t/61980183526e7b7cbf39774a/1637351812005/Cover+Crops+Brochure+2021+Farmers.pdf

The Environmental Quality Incentives Program (EQIP)
NRCS.USDA.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

Sustainable Agriculture Research and Education and the Sustainable Iowa Land Trust (SILT)
Projects.SARE.org/sare_project/onc19-055/

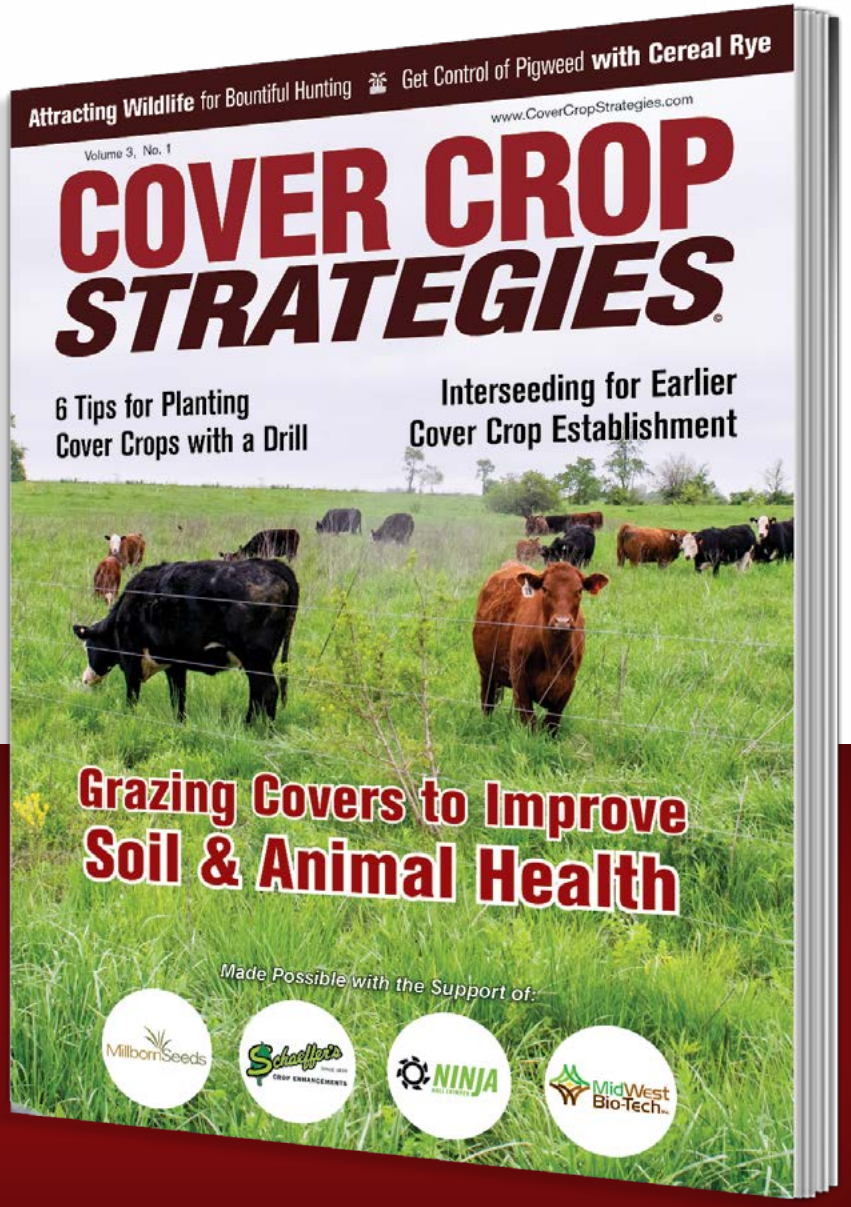
The Farmland Information Center's Publications Database
FarmlandInfo.org/publications/?search=ACEP

Wisconsin Women in Conservation
WIWIC.org

LEARN ABOUT THE MANY SOIL SAVING BENEFITS OF COVER CROPS

With the drought conditions that have plagued the west and the plains in recent years, there is growing concern that the U.S. could be heading toward another dust bowl. Thankfully, more and more farmers and landowners are learning about the importance of soil care, planting cover crops and reducing or eliminating tillage.

For authoritative, objective cover crop management information that you won't find anywhere else, download a FREE Cover Crop Management Report, *Cover Crop Strategies Volume 3.*



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