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WELL ROUNDED. Cereal rye, seeded uniformly and at a rate of 1 to 3 pounds per acre, provides a dense fall cover and plenty of biomass in the spring for dual-season weed control. Rolling is a control option that can be used alone or with a burndown herbicide.

A Cover Crop Bonus: Weed Suppression

With the pipeline of new herbicides hitting the market shrinking in the next decade, wisely chosen cover crops that establish quickly and are controlled properly can keep weeds at bay.

By Martha Mintz,

Contributing Editor

No-tillers are finding that weed suppression can be an added benefit of planting cover crops—simply by tweaking a few management strategies in their fields.

"The right cover crop, managed in the right way, can control well over 90% of winter annuals and even some spring perennials," says Dave Robison, Forage and Cover Crop Manager, Legacy Seeds.

Cover crops suppress weeds in a number of ways: through competition, by allelopathy (exuding a chemical that interferes with germination or growth of another plant), and as mulch after they've been burned down.

This alternative weed control can result in herbicide savings and fewer trips over the field, but it also may help sustain the effectiveness of herbicides.

Leaders in the crop-protection industry have said the frequency of new crop-protection products introduced will likely decline in the next 10 years, making the stewardship of existing chemicals even more important.

And there have been plenty of cases of herbicide resistance to show current chemistries have their weak points.

"A cover crop doesn't know the difference between a regular weed and one that is glyphosate, ALS or 2, 4-D resistant," Robison says.

If managed correctly, a cover will out-compete or smother them all for at least part of the growing season.

One Of Many Goals

"Weed suppression is likely to be a secondary benefit that no-tillers seek with a cover crop," says Penn State University weed scientist and cover crop specialist Bill Curran.

"No-tillers need to think of cover crops as part of a whole cropping system," he says. "The cover crop may be more expensive than herbicide, but it starts to pencil out a lot better when you add a weed-control component with a cover that also provides or scavenges nitrogen, reduces soil erosion, improves soil quality and builds organic matter."

Once no-tillers define their cover crop goals, they can determine if a few tweaks can add weed control to the mix.

For example, no-tillers looking only for soil health benefits and winter annual weed control may choose a crop they can plant in late summer or early fall that will grow quickly and then winterkill.

Spring oats and forage radishes —

either individually or planted together — fit the bill for this goal.

"Spring oats is really an under-appreciated cover crop," Robison says. "It gets going very quickly and puts on a lot of plant matter in the fall.

"It does a lot for building soils and even though it winterkills, the mulch will still provide some weed suppression in the spring — provided it achieved significant growth in the fall."

"It's important to sow oats at least 6 weeks before a frost to ensure sufficient fall growth," Curran says.

Power Of Cereal Rye

Robison notes that having good, healthy soil can reduce the length of spring weed control from a winterkilled cover crop as soil life will start devouring the biomass.

Cover crops capable of surviving winter can provide even more continuing weed control and, in some cases, produce nitrogen well into spring.

Cereal rye tops the list of cover crops that provide excellent weed suppression in both fall and spring, says Cereal Springs, Ill., conservation agriculture consultant Mike Plumer.

"Not only does it suppress weeds through an allelopathic effect and by out-competing them in the fall and early spring, the dense mat left after controlling it in the spring will provide early weed protection on summer annuals," he says.

Plumer has found a good stand of cereal rye will nearly completely eliminate growth of winter annuals, such as henbit, chickpea, shepherd's purse and downy brome.

"In the last 30 years of working with this cover, I've found that it also gives really good, early weed protection, eliminating early ragweeds and smartweed," Plumer says. "About 30% of the time, I've found no need for a herbicide treatment in no-till soybeans following burndown of a good cereal rye cover."

Preventing winter annuals from setting seed and not reopening the seed bank through tillage also means that weed pressure should decrease over time, Plumer says.

Advanced Cover Cropping

Suppressing winter-annual weeds is fairly simple, Curran says. No-tillers must establish a cover that gets growing quickly and competes aggressively for nutrients, water and sunlight.

However, a level of difficulty is added when trying to suppress summer annual weeds in corn and soybeans or other summer annual crops.

"To achieve spring and summer weed control, you have to manipulate the cover more," he says. "You have to think about when to plant, when to terminate and also consider proper fertility. It's treated much more like a cash crop in that situation."

Sometimes, pairing covers together can yield the best results.

Curran likes to team about 30 pounds of a cereal grain with hairy vetch before corn for fall and extended spring weed suppression, with an added nitrogen-production benefit.

It's important not to add too much winter cereal to this mix, he says.

"Cereals get up faster than the hairy vetch in the fall for better ground cover. They soak up excessive nitrogen from manure, and then add durability to the mulch in the spring," Curran says. "Legumes tend to degrade too quickly, so adding a small grain extends the weed suppression further into the season."

Hairy vetch, clovers and other legumes can fix in excess of 100 pounds of nitrogen per acre, Curran says, and growing nitrogen fits well with weed suppression goals, especially for corn.

"The longer a legume is left to grow in the spring, the bigger it gets and the more nitrogen is produced," he explains. "And more biomass is what we want for weed suppression, too."

A no-tiller's herbicide program may change a bit with cover-crop weed suppression.

"The cover crops can serve as the pre-emergence herbicide if you let them grow long enough," Curran says. "The cover is burned down and/or rolled.

It can suppress weeds for 3 to 5 weeks, and then a post-emergence

EFFECTIVE SUPPRESSION. Mike Plumer has seen cereal rye completely suppress marestail, such as in this plot, and other winter annuals. He's found that 30% of the time, a herbicide treatment isn't needed in no-till soybeans following a spring burndown of cereal rye.

Herbicide application can be used to control any weeds that emerge later. It works particularly well in glyphosate or glufosinate-tolerant (Liberty) cropping systems."

Indiana Success

Vincennes, Ind., no-tiller Ray McCormick is on a quest for healthy soils. He feels he's on the right track with a 'never-till' system and cover crops, nutrient management and precision technology.

He expects a lot from his cover crops, which are selected not only to suppress weeds but also improve soil health, increase water infiltration, produce and retain nutrients for cash crops and provide grazing for livestock.

McCormick's go-to cover crops are annual ryegrass, cereal rye, Austrian winter peas, crimson clover and radishes. In 2011 he planted 1,200 acres of cover crops in his corn-and-soybean rotation, and he intends to plant covers on 2,000 of his 2,200 crop acres in 2012.

"Weed suppression isn't my top reason for planting cover crops, but there's no doubt that it works," McCormick says. "This year, between dry weather and my covers, I haven't had to spray a post emergence herbicide on a lot of my fields. As of late June, there wasn't enough weed pressure to justify spraying — even with a product as inexpensive as glyphosate."

What cover crop is used on his farm depends on the crop rotation.

Some corn acres that will be planted to soybeans are seeded with annual ryegrass. Corn-on-corn and other corn-on-soybean acres get a mix of annual ryegrass and crimson clover.

Acres that he's able to drill — usually those following soybeans — get 30 pounds of cereal rye and 30 pounds of Austrian winter peas.

"The legume mixture sequesters nitrogen and carbon for the coming corn crop, in addition to all the other cover-crop benefits," McCormick says.

Wheat and double-cropped soybeans on his farm are followed by either Austrian winter peas and cereal rye, or crimson clover with annual ryegrass — depending on the goals for the field.

All of McCormick's cover crops are asked to establish quickly in the fall to crowd out winter annuals, and grow in the spring to hold off weeds and produce or scavenge nitrogen. "Two years ago, it was a very wet spring. A lot of people were late with burndowns and marestail got out of control," he says. "Marestail was tiny or nonexistent in my fields that had a cereal rye-mix cover. It held weeds back until I was able to get in the field."

Control Strategy

McCormick applies a burndown to cereal rye-mix covers within 24 hours of planting corn or soybeans. That allows for maximum nitrogen production by the legumes and more plant material to create the weed-blocking mulch. "I don't want to kill the rye and face the possibility of heavy rains making the residue a soggy, water-logged mess for planting," he says. The still-living residue doesn't present much of a challenge for planting, but McCormick notes that no-tillers need to prepare themselves and their equipment. "Planting into a thick cover crop is not for the faint of heart and I wouldn't recommend it to those that are new to no-till," he says.

His 30-foot John Deere air drill has plenty of down pressure to push through the residue and his maintenance program is intensive.

"I keep all of my row units in excellent shape. All the cutting parts and seed boots are kept in top condition and I go through the whole planter every year to make sure it's up to the job," he says.

Corn is planted at 2¾ inches deep to get under the residue and put seed in the right position for successful germination and growth.

"There is more uniformity of moisture and temperature further down, so I plant deeper," McCormick says.

Dense cereal-rye residue will continue to provide a mulch to prevent weeds, but nitrogen management in these conditions is critical.

"If cereal rye is in the mix, you absolutely have to feed the corn seedling at planting," McCormick warns. "Even when planted with Austrian winter peas or crimson clover, all of the nitrogen will be taken up by the cereal rye and there will be none for the new plant.

"By waiting to control the cover crop, you get the advantage of more weed control and more nitrogen produced, but the nitrogen is tied up in the plant growth, especially if you are using a cereal."

Pop-up fertilizer alone won't do the job, McCormick says, so he uses 2-by-2-inch placement of nitrogen at planting to get corn up and growing.

"Feeding at planting will get the corn through until the residue starts breaking down and releasing the nitrogen around tasseling when it's needed the most," McCormick says.

"About 30% of the time, I've found no need for a herbicide treatment in no-till soybeans following burndown of a good cereal rye cover…" — Mike Plumer

Organic Necessity

Cover crops for weed suppression are pretty much a given in an organic no-till operation like Bill Mason's.

Mason and his family have 550 of their 825 crop acres in Queen Anne's County, Md., certified organic, and they raise corn, soybeans and barley for the organic-feed industry.

"When we went organic, we found that cover crops played a big roll in a successful program," he says.

Mason drills cereal rye after corn with the goal of letting it grow in the spring before soybean planting.

About when it heads out in mid-May he uses a roller/crimper on the front of his tractor to control the cereal rye at the same time as no-tilling soybeans.

"The soybeans come up through the rye and the mulch holds the weeds down," he says.

In years where he's had a late or poor stand of cereal rye, he's had more issues with weeds.

"When it works perfectly, it conserves moisture and holds down the weeds, while allowing me to make fewer trips over the field in a no-till system," Mason says.

Following no-till soybeans, Mason drills crimson clover and barley into the stubble.

He's found aerially seeding this mix doesn't work in no-till soybeans because the mat from the last rye cover crop keeps seed from getting down to the soil to germinate.

Check Seeding Rates

Mason tries to get all covers seeded as early as possible. But if seeding is held up, he takes steps to improve his chances for success.

"The later it gets in the season, the more I increase the seeding rate," he says. "Timing is critical, though."

"I try to choose shorter-season varieties and hybrids in my cash crops so I can get my cover crops seeded in a more timely manner."

After soybeans, Mason lets the clover and barley grow until the clover heads out in the first part of May, giving him maximum nitrogen production. His organic system requires him to disc in the cover to terminate it.

"I still get early spring weed suppression and nitrogen for my corn crop," he says.

Mason would like to be in a 100% no-till system, but it's challenging for an organic producer.

"In organic farming, we make eight or nine trips over the field. No-till brings that number down significantly, but no-tilling organic corn has resulted in limited success due to insects and other challenges," Mason says.

Until he gets it figured out, he no-tills where he can and takes advantage of cover crops.

"Cover crops in an organic system are as important as the crop we're growing," he says.

Tips for Using Covers to Beat Tough Weeds

Each no-tiller has their own goals and challenges when integrating covers for weed management. Here are some steps for guiding the process:

1 Selection. High biomass is a necessity if weed suppression is the goal, says Bill Curran, Penn State University cover-crop specialist. How quickly the cover is able to achieve that biomass and how long it's sustained determines what kind of weed suppression no-tillers will get.

Forage radishes germinate quickly and put on a lot of growth, but then winter kill, Curran says.

"If you've got a problem like Canada thistle in the fall, then forage radish is a good option, but it won't do anything for weeds that emerge in the spring," he notes. "The same can be said for spring oats."

Some covers, such as hairy vetch, are slow to get started in the fall, but then thrive in late spring. Cereal rye provides the best of both worlds, establishing quickly in the fall and providing significant spring growth. Unfortunately, cereal rye doesn't fix nitrogen, but is useful in manured fields and works well with soybeans.

Some cover-crop mixes complement each other well for weed suppression.

FALL COVER. Fast-growing, dense cover crops, such as forage radishes and spring oats established in the fall, can suppress nearly all winter-annual weeds, but provide little to no suppression benefit in the spring.

Oats and hairy vetch or clovers with forage radishes work well, while cereal rye with forage radishes isn't the best fit unless they're spatially separated (i.e. alternating rows).

"Hairy vetch doesn't do much in the fall, while the radishes really take off. Then, the hairy vetch comes on in the spring," Curran says. "Radishes can, however, smother cereal rye, making those crops a more difficult pairing.

"This can be circumvented by separating them into different rows, but it is more challenging."

If both crops will survive the winter, no-tillers need to select cover crops that are synched for control timing — especially in organic systems.

"You want to be able to kill the mixture all at the same time, when each crop is at the right stage. Hairy vetch and triticale pair well for that reason," Curran says. "Cereal rye, however, matures 2 to 3 weeks before hairy vetch, so if you wait to control it until hairy vetch is at the right stage, it might set seed and you can get volunteer rye."

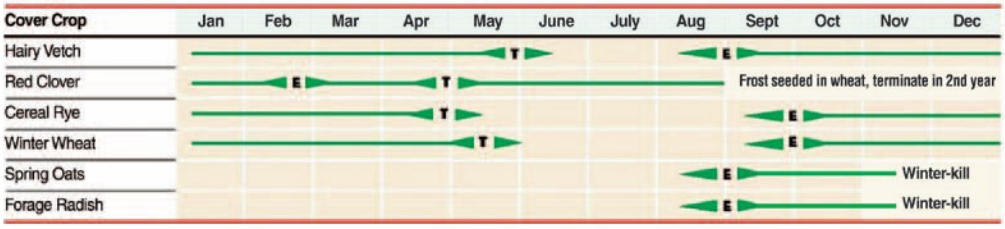
In organic systems, rolling alone may not control covers that are in different growth stages, causing major issues.

Choosing the right cover crop depends on a number of other factors, which is why the Midwest Cover Crop Council is continually working to build and expand decision maker tools on their web site.

At www.mccc.msu.edu, no-tillers can plug in information about their farms, soils and rotations to determine the best cover crops. More states are being added to this program.

Cover Crop Phenology

Making the most of cover crops requires considering the best times for establishing and terminating a cover crop, and deciding which cover and cash crops will complement each other on your farm. This chart presents the approximate windows for establishing (E) and terminating (T) several cover crops in Pennsylvania.



CHOOSE WISELY. Determining seeding and termination dates by region can help no-tillers realize success with cover crops. This Penn State University chart should apply to the central Corn Belt and Mid-Atlantic states, says Bill Curran, Penn State cover-crop specialist. Also, check out the cover crop decision-maker tool at www.plantcovercrops.com.

2 Establishment. Cover crops must establish quickly and be seeded so they dominate the soil, water and sunlight resources to outcompete and suppress weeds — especially winter annuals.

"The date and rate of seeding is important for weed suppression," Curran says.

In Pennsylvania, he notes that cereal rye should be seeded by early October to put on sufficient growth for fall and spring weed suppression. And the earlier it's planted in the fall, the faster it gets growing in the spring.

Corn cut for silage or small-grain acres is a great opportunity to get cover crops established in late summer. But there are possibilities where grain corn and soybeans dominate.

"South of I-94 in Michigan and I-80 in Illinois, I've had a lot of success aerially seeding oats, cereal rye and turnips, or annual ryegrass, radishes and crimson clover into standing corn and soybeans and achieving enough growth to suppress weeds," Robison says.

Aerial seeding has been the most successful for Robison when about 50% of sunlight is getting to the ground in corn and when soybeans have about 50% yellow leaves.

"I like radishes in the mix. They grow quickly and winterkill, while the crimson clover overwinters to provide extended weed suppression and nitrogen," he says.

Getting a good, even cover that will outcompete weeds often requires bumping up the seeding rate a bit, Robison says. He recommends seeding 1 bushel of cereal rye per acre, 20 to 25 pounds of aerially seeded annual ryegrass, or 15 to 20 pounds of drilled annual ryegrass and 48 to 50 pounds of spring oats.

Curran recommends 1 to 3 bushels of cereal rye and says drilling is his seeding method of choice, rather than broadcast seeding.

"You need good uniformity to get weed suppression. There can't be gaps where soil is exposed," he says.

Custom rigs — such as seeders on combine heads and highboy sprayers modified with drop tubes — also allow for timely cover-crop seeding. Plumer warns that seeding rates in mixes may need adjustment.

"If cereal rye is too thick, it won't let anything else grow with it. The same with radishes," he says. "Mixes sometimes need to be adjusted and commercial mixes may not be the best route."

For example, Plumer says oats alone would be seeded at 40 to 50 pounds per acre and radish alone would be 6 to 10 pounds. But in a mix, oats would be 20 pounds and radishes 3 to 4 pounds.

For the best weed control, Plumer also recommends doing a burndown ahead of seeding cover crops.

READY AND WAITING. Red clover interseeded into winter wheat fills in after harvest to suppress weeds and produce nitrogen.

PHOTO COURTESY OF PENN STATE UNIV.)

PHOTO COURTESY OF PENN STATE UNIV.)

EXTENDED PROTECTION. High-biomass covers that overwinter, such as hairy vetch (pictured with corn) or cereal rye (with soybeans), provide extended suppression, including spring annuals and some perennials.

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MORE PROTECTION. High-biomass covers that overwinter, such as hairy vetch (pictured with corn) or cereal rye (with soybeans), provide extended suppression, including spring annuals and some perennials.

3 Nutrient Management. Cereal rye, winter oats and other small grain cover crops, as well as forage radishes, don't do well in low-nitrogen conditions, Curran says.

"Without nitrogen, cereal covers won't tiller and be aggressive like they need to be for weed suppression," he says.

Following corn, nitrogen is likely to be scarce. His solution is to apply livestock manure to small-grain covers in the fall or topdress nitrogen if necessary.

"That nitrogen won't be lost. After the cover crop is controlled, it will release the nitrogen back to the crop," Curran says. "But cereals will hang onto it longer, so I like to use cereals before soybean and legumes before corn. The lush legumes release their nitrogen a lot faster, providing it to the subsequent corn crop."

4 Control. Deciding when to control a cover crop that has overwintered without losing an extended weed-suppression benefit depends on the no-tiller and their comfort level.

There's a fine line to walk in that the cover needs to achieve enough biomass to create a thick mulch, but it can't be allowed to draw too much moisture from the ground or become a weed itself, Plumer says.

For cereal rye and annual ryegrass ahead of corn, Robison prefers to burn down the covers before they joint.

He's fine, however, with no-tilling soybeans directly into living cereal rye and burning it down before it's too mature for the herbicide to work.

Curran recommends not planting into a living cover in his region (Pennsylvania) due to potential insect concerns and residue issues that can affect good seed-to-soil contact.

In the area's organic systems, cereals and hairy vetch are controlled with a roller/crimper and planted soon after rolling. Some conventional no-tillers opt to burn down covers with glyphosate plus other herbicides and use the roller a day or two later, waiting a week to 10 days before planting a cash crop to avoid insect and higher residue problems.

"The roller/crimper is a nice option because it puts the residue immediately down on the soil to gain more mulch benefit," Curran says.

Covers are sprayed and then rolled as quickly as possible. With farmers that use herbicides, planting typically occurs a week or 10 days later when the cover has had a chance to dry down.