February 11, 2016 Cover Crops webinar: So, Why do you want to grow cover crops?

Nathan Anderson, Dr. Joel Gruver

Question log

Web resources

Midwest Cover Crops Council covers 13 states.

http://www.mccc.msu.edu/

Is there a web link for the University of Maryland Cover Crop information?

http://mda.maryland.gov/resource_conservation/Pages/cover_crop.aspx

What criteria of recommendations required for cover crops to grow under semiarid region of southwest Saskatchewan?

Cover Crops 2.0 was a 2014 webinar series on cover crops in semiarid regions. There was a follow up article in the January-February 2015 issue of Crops and Soils, "The water conundrum of planting cover crops in the Great Plains: When is an inch not an inch?"

How much % runoff loss reduce due to cc in general?

There is no way to provide a general number for the decrease in runoff achieved using cover crops. That will vary based on percent cover, slope, soil texture and surface conditions, and rainfall intensity, among other factors.

Fertility

Do we need to fertilize cover crops?

In most circumstances, I would say no. If you have a longer growing season and are trying to fertilize to produce more forage, maybe. If your soil tests are low in fertility and growth is inhibited in your cover crops, then it might be a good idea. We have not fertilized for our covers.

Do you have thoughts on N cycling? How long will it take for residue N to become available?

N cycling has so many variables that I struggle to make any predictions about N availability. N cycling varies tremendously based on C:N ratio and a number of other factors. Most of our broadleaf covers have pretty low C:N ratios, while our rye at times can have higher C:N ratios if we wait until it is big to plant soybeans into. The N available in residue can depend on soil temp, moisture, biological activity, and other factors that I don't have a good handle on every year.

The decomposition rate will control the nitrogen in residues to become available. As noted above, the C:N ratio will affect whether mineralization or immobilization occurs. The chief climatic factors will be soil temperature and moisture content. Too little water and/or cool temperatures limit biological activity, and the decomposition rate. Too much water limits the decomposition rate and can result in denitrification. Research on this topic is ongoing at many universities and USDA labs.

Nathan: Do you have data on changes in OM, soil fertility, and yields since you began using cover crops?

> We have been using covers for 5-6 years now, which is relatively short to document OM and fertility changes. We will be starting our next round of managed zone soil samples in the next year to two, and hope to see some changes. We have some yield data in partnership with Iowa Learning Farms that will be released soon from one of our on-farm trials. The yield influence of covers can also vary based on management and other factors. In general, our corn yields have had a greater benefit in a dry year vs. average or wet. Corn yields have also improved more in our marginal ground. I would speculate this is also a water infiltration and soil moisture issue.

How do you think the cover crop and grazing will affect variable rate fertilizer application?

> If I were grazing at greater densities, they might have more impact. Our P & K values are very good based on our zone soil tests, so we are already applying minimal amounts in most areas.

How do you integrate manure into your operation? Will manures burn the cover cropsif applied overthe top?

> When applied with a good spreader, I have yet to see manure burn cover crops, even at 4 tons/A of bedded turkey litter. I do more damage with vehicle tracks during application. Controlled traffic can help tremendously with this. Our cattle manure is usually composted before it's applied, which helps with clumps that might smother areas of covers. Most of the dry manure we applied has been composted to some extent or is from bedded animals. We don't apply raw chicken manure, which I would think would have the greatest likelihood of burning covers. Applying high rates of cattle feedlot manure might result in some smothering depending on the rates used, but I don't know for sure what those rates would be.

If applying manure (Hog, turkey) to the surface. How much volatilization is occurring? Most would think that you would lose a lot of N to volatilization if not incorporating…

> I'm always concerned and wonder about this, trying to figure out the best way. The hog manure we use is injected with a low disturbance opener, which results in little volatilization and reduced cover crop damage. If I applied turkey litter and incorporated by tillage, I'd be concerned about more loss via soil erosion of primarily P. Most of our manures have been composted or bedded to some extent, so they have a lower risk of volatilization than fresh or raw manures. This is an issue I wish I had a better answer to for our operation specifically.
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> Atmospheric conditions have a great effect on volatilization. Generally there is less volatilization in cool temperatures. Volatilization also depends upon the form of N in the manure; greater concentrations of urea and moist conditions can result in significant volatilization.

How or what is being done to help farmers apply the 4R's specific to nitrogen types, rates, and timing in a cover crop environment?

> This a new area of research, and it is being done in many regions and states now. Keep in touch with the local extension and research (university and USDA) organizations for new developments.

Seeding/Establishment

Can you seed all cover crops in the fall?

> Depending on what you want growing in the spring, yes, given you have the time for covers to get established. All of our covers with the exceptions of ones following small grains are established in the fall.

When is the best time to seed cover crops?

> When you can get them sunlight, moisture, and enough growing season to get established. This is a general question that's tough to answer without knowing more specifics about the system or operation.

Is there a "rule" for timing CC aerial seeding in standing corn and soybean fields?

> Sort of, I like to have light on the ground to aerial seed. In soybeans this means maybe 30-40% leaf yellow, in corn maybe brown leaf at the ear. The "rules" have some flexibility to account for needed moisture to get seed germinated. I'd focus a bit more on moisture than specific canopy yellowing.

I keep hearing about what you and others are using in front of Soybeans. What are you doing in front of a corn crop and being successful? What are your major concerns?

> In front of corn, I like to use crops that winter kill or have strip-till done so I have a darker area to plant. My current mix is spring barley, brown mustard, and rapeseed. I have done winter rye before corn, but want to make sure that it is terminated 10-14 days before planting. If you are in a warmer climate or have liquid fertilizer on the planter, you may be able to shorten this window a bit.

Are your corn & soybeans in wide rows? 36" or 30" Aerial seeding has been erratic in SW Ohio for 30" corn at 36,000 pop and narrow row (15") beans.

> We are in 30" corn with an average population of 34,500 and in 15" soybeans. Our aerial seeding is usually more erratic due to pilot application methods than my row width.

What limitations does a typical weed control program pose to establishing and growth of cover crops, either interseeded or after crop harvest?

> The biggest issues come from herbicides with prolonged residual activity, particularly on broadleaves. These herbicides are very valuable in soybean production in particular, but can effectively limit cover crop seed germination, sometimes for years. A number of pre-emerge herbicide products for soybeans have 30+ month rotation intervals to brassica species. Watch labels very carefully when planning for a cover crop.

Termination/Following Crop

What issues and management solutions occur with early frost in fall or hard freezes in the winter?

(not sure if I fully understand what they're asking here)

An early hard frost in the fall means my covers are done growing for the season. I don't have a lot of management solutions to overcome that. Most of our cover crop species are cold tolerant, so they can take a light frost relatively well. Hard freezes in the winter usually don't affect winter annual species like cereal rye too negatively. If we have minimal snow cover and some very cold temps, we can reduce our winter survival but I still find it to be an acceptable stand.

How do you prepare your field for the crop following your covers?

Soybeans following covers- I make sure my disc openers and closing discs are doing their job effectively and I plant. Straight no-till into the standing cover crop.

Corn following winter-killed covers- I make sure my row cleaners and down pressure are set well, making adjustments as needed, and plant.

Corn following spring-killed covers- I usually have done some form of strip-till to give me a dark strip to plant into.

I've found that tillage and cover crops don't go very well together, especially with overwintering covers like cereal rye. It can make clumps and root balls that are harder to plant through than if the rye is no-tilled into. It is also easier to plant soybeans into rye that is not all the way dead and dried out. The row slot gets closed better without the closing discs dragging rye straw into the furrow.

How do you terminate your cover crops? What method did you use to terminate the CC in the spring?

Winter terminates some of my covers, particularly ones before corn. Overwintering covers are usually terminated with glyphosate before planting. I've tried other herbicides but it seems to be the most effective. I've also used mowing to kill rye before soybeans, mowing the rye after it has fully headed out. It was somewhat effective, but some tillers survived and I needed to use an herbicide application after some leaf area recovered.

Are there any problems with vegetable seeds germinating into a decomposing stand of tillage radishes present at seeding?

I don't have experience or knowledge with vegetable/horticulture scenarios to formulate a good response. Great question- Maybe direct to Ajay Nair with the Horticulture Dept. at Iowa State University. He would have the experience and research to answer your question.

Are there any tools that incorporate herbicide residuals?

You mentioned avoiding "burner" herbicides. Why?

> Avoid burner herbicides while trying to kill cover crops with an herbicide like glyphosate. Burner herbicides can burn leaf tissue that interferes with the absorption and uptake of glyphosate and reduce the effectiveness of terminating the covers.

What is your herbicide program in corn? What type of residual do you use that does not inhibit your broadleaf growth?

> Without endorsing particular products, we use dicamba-based herbicides, along with glyphosate and glufosinate herbicides. Finding a residual herbicide that, by label, doesn't have a restriction to broadleaf cover crop species is something I have struggled with. We have used Staunch/TripleFlex/Surestart products on ground with a lower diversity of cover species that we aren't grazing. I always try to avoid making specific herbicide recommendations, but would encourage looking through resources from Iowa State University, Purdue, and other research institutions as well as local chemical providers that would know your specific situation and target weeds.

https://store.extension.iastate.edu/Product/Herbicide-use-may-restrict-grazing-options-for-cover-crops

> https://ag.purdue.edu/btny/weedscience/Documents/Rotation_Restrictions.pdf

Is there a danger of any of the species that do not winterkill and must be terminated by herbicides becoming glyphosate resistant if that is all that is used to terminate them? Or has anyone looked at the possibility of any of these species becoming "weeds" in the future?

> Yes, there is some data to show that annual ryegrass is becoming glyphosate resistant, which is why we don't plant annual ryegrass. If we had escapes, volunteer cereal rye, or only partial control of cereal rye, I'd be more concerned. I'm aware of the potential while looking at other ways to kill a rye cover crop.

Nematodes/Pest Management

Are there any known benefits from rape cover crop concerning nematode or other pest population?

Are there problems with nematodes that can be controlled with the use of cover crops?

What about cover crops and disease management? Does that decide what goes into the mixture?

Interested in biofumigation potential of cover crops. Thoughts? Species of interest?

Are data available to show how the nematodes that feed on corn would be affected by each

cover blend?

Grazing/compaction

Are all your cover crops grazed?

> No

Is compaction a problem with pasturing cover crops? Do you have compaction problems after grazing the fields?

> It is a concern, but I don't feel it is a problem. Some data from a PFI study and NRCS would support that. It depends on the density of livestock, duration of grazing, soil moisture, and a number of other factors.
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> http://practicalfarmers.org/blog/2015/02/26/research-report-grazing-cover-crops-corn-ground/
>
> http://agresearchmag.ars.usda.gov/2015/feb/cattle
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> We have seen concentrated areas where we get surface compaction on a well-travelled area, but for the most part, no.

In Southeastern Saskatchewan we are finding a hard pan on the soil. Especially in crops like grazing corn. Have you seen positive results with tillage radish? If not what can we do to break up that hard pan?

> I have little experience with oilseed radishes like the tillage radish. It is my opinion that they are very costly for the growing season I have available. I would suspect, given the taproot on oilseed radishes, that combining them with a plant with fibrous root systems could alleviate hard pan issues. We like rapeseed in our mixes. It doesn't have a taproot like oilseed radishes do, but can still penetrate a compacted layer and make rooting channels. The diversity of rooting patterns from a cover crop mix can help.
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> > What is the depth of the hardpan? Is it caused by tillage or grazing? Your description suggests that it is not surface compaction since you are interested in tillage radish. Soil type (sand, silt, clay, combined with organic matter content) has a great influence on the potential for compaction, and the methods required to alleviate that compaction. Soil moisture content is also a factor; many soils with high clay content will shrink and crack, breaking up the hard pan naturally, if they have an opportunity to dry. Controlled-wheel traffic is one of the best ways to avoid compaction across the whole field since all compaction is isolated to specific zones in the field.

Economics

Is there any cover crops which have higher value for farmers? Or is there any cash cover that will serve as cover crop.

> > Check out the following (February 18) webinar, "Show me the money! Can cover crops pay?"