

## A few thoughts on incorporating/managing cover crops

Cover crop questions have begun to pick up in recent weeks. Many of these have stemmed around termination timing and method to maximize the benefit of the cover crop while minimizing the potential negative impacts associated with the cover on the following cash crop. I've got good and bad news for you. . .

First, the good news is almost all of these practices have been evaluated in great detail in other areas of the country and are currently being evaluated here in TN. You can read about some of the TN research in [Garret Montgomery's March 11th blog article](#).

Beginning in the mid 90s, a tremendous amount of research was conducted by the USDA-ARS National Soil Dynamics Lab on utilizing high biomass cover crops within multiple production

systems. Evaluated covers included cereal rye, wheat, clover, sun hemp, lupin, and oats to just name a few.

Through a tremendous amount of systems work conducted by numerous experts in their relative fields, researchers were able to pin down a relatively sound approach to maximizing cover crop benefits while minimizing potentially negative impacts of incorporating this management tool into the production system. One could spend days reading about their findings (please see links below) – and if you are considering incorporating covers into your production I suggest you do- but I will try to summarize a few of the most relevant findings below. They generally found:



1. When considering single-species cover crops, monocot covers (cereal rye, oats or wheat) typically were capable of producing the largest amounts of biomass.
2. Single species monocot covers, which were higher in C:N ratios as compared to legume alternatives, lasted longer through the growing season and suppressed weeds longer. In contrast, leguminous, N fixing covers were capable of providing N to the following cash crop but typically did not suppress weeds as long through the season.
3. The best approach to suppressing weeds and achieving a consistent cash crop stand was to roll the high-biomass cover crop immediately before applying a terminating herbicide to the cover crop, and then planting the cash crop into the crispy residue roughly two weeks later. Terminating at this date typically:
  1. eliminated the green-bridge effect which is a concern for insect pests;
  2. allowed the planter to consistently achieve the proper seeding depth and subsequently establish an adequate stand;
  3. provided an opportunity for spring rains to re-charge the soil water reserve which has been reduced by the winter cover; and
  4. maximize the time in which weeds are suppressed through the growing season by the cover crop.
    1. Although pre's were still deemed to be necessary in many of these trials, it did appear that the incorporation of a cover crop could prevent the need for at least one early post application which would be required in a winter fallow or conventional system.

So what is the difference between that environment and ours?

1. Most of this research was conducted in more-southern latitudes. For much of TN, we will likely not be able to achieve such high levels of biomass due to our shorter growing seasons.
2. Most of this research was conducted within a conservation tillage system where planting follows a sub-soil tillage activity. For clarification, this implement typically consisted of a lead coulter, a deep shank targeting the compaction layer around 12", and press wheels. Cover crop residue was sliced with the tillage implement, row cleaners sloughed residue away from furrow, and seed was placed in a consistent, slightly disturbed seedbed.

Now the bad news. . . we (as a collaborative group of Agricultural Scientists) have an extremely limited dataset on multiple species mixes. This includes the soil health mix currently promoted by the NRCS. Several of my colleagues here at TN, including Dr. Mike Buschermohle, are collecting as much data as possible but generating conclusive evidence takes years. The preliminary results I will share below are from one year of data from the Small Grains Research and Extension Program across two locations. These findings are preliminary at best but do represent a first-look at the integration of a soil health cover crop mixture into our production system as compared to standard activities (fallow winter followed by full-season soybeans or a wheat/soybean double crop system).

1. The highest amounts of biomass were typically noted with the single species monocot treatments, with the wheat for grain treatments typically resulting in the most biomass followed by the rye cover and wheat cover treatments.
2. The tillage radishes winter-killed soon after emerging and did not contribute significantly to spring biomass.
3. Given tillage radishes were not present at time of soybean planting, assessment of impacts on following crop yields are limited.
4. The highest weed pressure was noted in the clover treatment, followed by the soil health treatment and finally the fallow treatment. It is suspected the fallow treatment was characterized by slightly less weed pressure due to the lack of surface disruption in comparison to the soil health and clover treatments, which were planted with a drill (slight surface disruption).
5. All cover crop treatments were followed by soybeans. The only significant difference in yield between any treatment was associated with the delayed planting of the soybeans in the double crop scenario.

Take home? If adopting this system, I'd lean towards a conservative approach. Collect as much information as possible from unbiased sources, understand that stand establishment may be more of a challenge and planter setup will take more time, and initially look to incorporate the practice on a limited number of acres.

[Cover Crop Termination Timing](#)

[Cover crop use to suppress Palmer in Conservation Tillage Systems](#)

[Roller type for terminating cover crops](#)

[Ability of a roller to terminate alone \(without the use of an herbicide\)](#)

[Weed suppression and cover crop management/price considerations](#)