United States Department of Agriculture

NRCS Natural Resources Conservation Service

Cover Crops to Improve Soil in Prevented Planting Fields

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Indiana GUIDE SHEET

Prolonged rain and flooding has resulted in many fields that will go unplanted this year. Farmers in this situation need to weigh not only their program and insurance options ("prevented planting"), but should also assess agronomic options to ensure long-term productivity from this difficult situation.

Producers should explore the benefits of planting a cover crop that has the potential to fix nitrogen, build organic matter, control weeds, control erosion and/or improve soil quality during the remainder of the season. These together can build considerable yield potential for following crops. With the potential "prevented planting" payment and the improved yield potential following a full season "green manure" crop, their economic potential for the whole rotation could be considerable.

Producers are advised to check with FSA on harvest restrictions for cover crops.

A key soil quality concept is to ensure that there is vegetation green and growing during all times of the year.

Building vs. Loss of Topsoil: As excessive rainfall runoff or flood waters cut across unprotected fields, the top soil may have been lost from erosion and scouring. With the productive topsoil lost, so too are the nutrients, organic matter, and soil biology. If tillage is applied to these water-damaged fields to control weeds or smooth them out, even relatively flat soils will lose carbon, nitrogen and biomass.

The above-ground biomass of cover crops will help protect the soil from further sun, wind and water damage.

Selecting high bio-mass cover crop mixes will rebuild topsoil. Cover crops, especially if no-tilled, will add organic biomass both above and below ground to rebuild topsoil quicker than if left to grow weeds or especially if left with no cover.

Avoid harvesting for forage or grain, which will reduce the organic matter benefits, and instead consider killing or mowing prior to seed-head formation, particularly if reseeding could be incompatible with subsequent crops. This will also ensure rapid decomposition and leave more nutrients in the below-ground plant material that are available to soil organisms and subsequent crops.

Soil Biology, Structure and Compaction: Many fields saturated for long periods lose soil organisms that create soil macro-pores and cycle nutrients and lose beneficial soil biology, such as mycorrhizal fungi and rhizobia bacteria that build structure and tilth. Without these organisms, the soils are very subject to compaction, crusting, and high bulk density problems.

Some fields may be so compacted that deep tillage or other remediation activities are needed. However, cover crops, whether used alone or in conjunction with other compaction remediation activities such as deep tillage, are essential to rebuild healthy soil structure. The roots of cover crops help to penetrate compacted zones, hold soil aggregates together, and sustain healthy organisms to restore soil structure. Growing roots are essential to re-establish the mycorrhizae in the soil and to create pathways for air and water to move through the soil profile, which are key components to restoring the soil's functional properties and will keep the recently deep-tilled layers more open to result in a quicker fix of the compacted layers.

Building vs. Loss of Nitrogen: Cover crops can build organic nitrogen, and/or sequester residual Nitrogen in the soil.

A legume or legume mix planted in early summer can easily provide 60-100% of the needed Nitrogen of a following corn crop.

A brassica or grass, or brassica+grass mix can scavenge over 40 pounds of residual N from the soil, and even more in situations where manure or preplant nutrients have been recently applied. Additionally, this results in a more rapid gain in total soil biomass and a higher total nutrient availability for subsequent crops.

Cover Crop Species Guidance: Cover crop selection and management should focus on maximizing both above and below-ground biomass and encouraging nutrient cycling as deep in the soil profile as possible. Choosing a mix of a grass with a fibrous root system and a legume or brassica with a tap root will usually provide the widest range of benefits.

Planting wildlife friendly cover crops such as buckwheat or brassicas and leaving the growth and/or the grain can be a very valuable winter food source for a wide variety of wildlife and pollinators.

Legumes alone or in combination with grasses can provide quicker soil biology/biota restoration and Nitrogen fixation. Nitrogen fixation is directly related to growth and development of the legume. An early summer planted legume such as cow peas, will grow rapidly and fix a good amount of N prior to a killing frost when it will be terminated. For later plantings, an over wintering legume such as Austrian winter pea should be considered. Make sure all legume seed is inoculated.

Brassicas provide excellent weed control and Nitrogen scavenging potential. The tap roots are excellent at penetrating tillage pans and dense soil layers.

Seeding and Establishment: One of the challenges an early to mid-summer seeding is the timeliness of rainfall after seeding for germination. It is best if the seed is drilled. This will also address concern about crusted soil and seed-to-soil contact.

Use the following tables and or the Indiana NRCS Seeding Tool at:
http://www.nrcs.usda.gov/technical/efotg/

Summer Cover Crops

Plant Species	Seeding Rate (lbs/Ac of PLS[1])	Seeding Dates	
		North of I-70	South of I-70
Spring Oats[3]	60	3/15 to 5/31	3/1 to 5/15
Annual Ryegrass	15 - 20	3/15 to 6/15	3/1 to 5/31
Sudangrass & Sorghum- Sudangrass (Frost-seeded into fall planted small grains)	20	5/15 to 7/15	5/1 to 7/15
Buckwheat	30 - 50	6/15 to 8/15	6/15 to 8/15
Millet	15	5/15 to 7/15	5/1 to 8/1

Winter Cover Crops

Plant Species	Seeding Rate (lbs/Ac of PLS[1,3])	Seeding Dates	
		North of I-70	South of I-70
Annual Ryegrass	15 - 20	8/15 to 10/1	8/15 to 10/10
Cereal Grains[3]			
Cereal Rye[3]	56 - 84	8/1 to 10/31	8/15 to 11/10
Winter Wheat[23]	60 - 90	FFD[2] to 10/15	FFD[2] to 10/31
Spring Oats[3]	32 - 48	7/1 to 9/15	7/1 to 9/30
Winter Triticale[3]	75	8/1 to 10/15	8/15 to 10/31
Legumes[4]:			
Hairy Vetch	30	8/1 to 9/15	8/1 to 9/30
Field Peas/ Winter Peas	50 drilled, 70-90 broadcast	8/1 to 9/15	8/1 to 9/30
Cow Peas	40 drilled, 70-90 broadcast	7/1 to 8/15	7/1 to 9/1
Crimson Clover	12 drilled, 20 broadcast	7/1 to 9/15	7/1 to 9/30
Mixtures:			
Hairy Vetch and Cereal Rye	20/40	8/1 to 9/15	8/15 to 9/30
Spring Oats and Brassicas	40/3-8	8/1 to 9/15	8/15 to 9/30
Other:			
Brassicas-Rape/Canola/Turnips	4 drilled, 8 broadcast	8/1 to 9/15	8/1 to 9/30
Oil Seed Radish	10 drilled, 12 broadcast	8/1 to 9/15	8/1 to 9/30

[1] Pure Live Seed (PLS) [2] Not to be planted prior to Fly Free Date (FFD).
[2] Not to be planted prior to Fly Free Date (FFD)
[3] Use the upper seeding rates of bulk seed for cereal grains that are cleaned but not certified.
[4] Seed size can vary greatly. Rate can be adjusted up for large seed and down for small. Inoculate seed.

Additional References:

Midwest Cover Crop Council: http://www.mccc.msu.edu/

Indiana NRCS Agronomy page:
http://www.in.nrcs.usda.gov/technical/agronomy/Indiana%20Agronomy%20Resources/Agronomy%20Resources.html

Sustainable Agriculture Research and Education (SARE):
Manageing Cover Crops Profitably http://www.sare.org/publications/

Natural Resources Conservation Service - Field Office Technical Guide (eFOTG):
http://efotg.nrcs.usda.gov/treemenuFS.aspx