Missouri Information Sheet
Using Cover Crops for Prevented Planting Acres

IS-MO-340

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Prolonged rain and flooding has resulted in many fields that will go unplanted this year. Producers 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 capture applied nutrients, fix nitrogen, build organic matter, control weeds, control erosion and/or improve soil health and biology during the remainder of the growing season. These together can build considerable yield potential for following crops.

Producers are advised to check with USDA's Farm Service Agency (FSA) and their crop insurance agent on prevented planting requirements and haying, grazing, harvest restrictions for cover crops. For more information, USDA's Risk Management Agency (RMA) recently published a frequently asked questions (FAQ) on crop insurance and prevented planting.

Link for the website is: 2015 Excess Precipitation for Kansas, Missouri, and Nebraska
http://www.rma.usda.gov/help/faq/ksmone_excessprecip.html

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

Building vs. Losing 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.

Above-ground biomass of cover crops helps protect the soil from further sun, wind and water damage. Selecting high biomass 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 removing biomass from the field by harvesting for forage or grain, which will reduce the organic matter benefits. 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 roots 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 mycorrhizae fungi and rhizobia bacteria that build soil structure. Without these organisms, the soils are very subject to compaction, crusting, and high bulk density problems.
Some fields may be so compacted that remediation activities are needed. However, cover crops, whether used alone or in conjunction with other compaction remediation activities, 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 pathways more open to result in a quicker fix of the compacted layers.

Building vs. Losing 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 help provide some of the needed Nitrogen of a following corn crop. A brassica or grass, or brassica and grass mix can scavenge 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. Make sure all legume seed is properly inoculated. Remember that planting brassicas too early (prior to August) may cause them to bolt and produce large tubers or seed.

Herbicide Concerns

Ensure herbicides used with crops in the rotation are compatible with cover crop selections and purpose(s). Some herbicides will carry over in the soil and restrict cover crop establishment, uses, and growth.

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. Just remember that allowing cover crops to produce seed may not be desirable in many cropping situations.

Seeding and Establishment

It is best if seed is drilled or planted with planting equipment. This also addresses concerns about crusted soil and seed to soil contact. If seed is broadcast see the broadcast seeding rate in Appendix 1 of the Missouri Cover Crop (340) standard.

For more information on species selection, seed dates, and rates please see the Missouri Cover Crop (340) standard Appendix 1 located at http://efotg.sc.egov.usda.gov/treemenuFS.aspx

Cover Crops Recommendations by Resource Concern 3/

Resource Concern	Species Mix	% of Pure Stand Rate	lbs./acre of Seed (Drilled Rates)	Seeding Dates
SUMMER COVER				
Erosion Control	Sorghum/Sudangrass	20	3	See Cover Crop Standard for Seeding Dates
	Buckwheat	30	7.5	
	Oilseed Radish **1/** Or Forage Turnip	20	1 Radish 0.5 Turnip	
	Cowpea	30	15	
Nitrogen Fixing	Cowpea	30	15	See Cover Crop Standard for Seeding Dates
	Soybean	50	20	
	Sunnhemp	20	4.5	
LATE SUMMER/EARLY FALL COVER CROPS				
Soil Building/N Scavenge	Cereal Grain (Cereal Rye, Winter Wheat, Winter Triticale) **2/**	60	24	See Cover Crop Standard for Seeding Dates
	Oilseed Radish	40	2	
Erosion Control	Cereal Grain (Cereal Rye, Winter Wheat, Winter Triticale) **2/**	60	24	See Cover Crop Standard for Seeding Dates
	Hairy or Woollypod Vetch	40	6	
Nitrogen Fixing	Cereal Rye or Winter Triticale **2/**	20	8	See Cover Crop Standard for Seeding Dates
	Crimson Clover	40	6	
	Hairy or Woollypod Vetch	40	6	

Footnotes:

1 / Oilseed radish will bolt when seeded in the spring and will produce seed.

2 / Be aware of cover crop seeding dates and Hessian Fly dates in Missouri, see attached University of Missouri Extension guide. (See below)

3/ The above cover crop recommendations are suggestions only. Design a cover crop mix that meets your needs and desired benefits.

AGRICULTURAL
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Hessian Fly Management on Wheat

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The Hessian fly, *Mayetiola destructor* (Say), is one of the most destructive pest species of wheat. This insect probably originated in the southern Caucasus region of Russia and was accidently introduced into North America when Hessian troops imported straw bedding during the American Revolutionary War. Hessian flies were first observed on Long Island, New York, around 1779. Today, they are present in most wheat-growing areas of the United States. Around the turn of the 20th century, this insect destroyed millions of bushels of wheat in Missouri.

Description and life cycle

Hessian flies overwinter as full-grown larvae or maggots inside protective cases called flaxseed because of their resemblance to real flax seeds. Once wheat begins to grow in the spring, adults emerge (usually April) and mate. Adult Hessian flies are small (less than ⅛ inch long), dark (female has an orange-red abdomen), long-legged, two-winged insects that resemble mosquitoes. Even though adults are weak fliers, they can be carried aloft for several miles by strong winds. Once a female has mated, she can lay 250 to 300 eggs in her short life span (4 days or less). The very small, slender, reddish eggs are laid end-to-end in small groups (2–15 eggs). The eggs are deposited in grooves on the upper leaf surface. Females prefer to deposit their eggs on several young plants, but most of the eggs may be laid on a single plant.

After hatching (3–10 days) from their eggs, legless Hessian fly maggots are initially a reddish color before turning a whitish color. They prefer to feed within grooves between the leaf sheath and stem (Figure 1, left). Maggots feed by using their mouthparts like sandpaper on the leaf surface and sucking up plant juices that seep out. They become stationary once they begin to feed and they never cut into the leaf sheath or stem. Depending on the weather, the maggots usually reach their maximum size in two weeks. Then, their outer skin becomes loose and hardens into a brown, protective shell, or "flaxseed" (Figure 1, right) The flaxseed stage persists during the summer until volunteer wheat or early-planted wheat is present. Annually, there are two generations in Missouri unless wet conditions permit an extra spring or summer generation. This insect will also attack barley and rye, but wheat remains its favorite host.

Facts at a Glance

- Hessian fly adults are small and mosquito-like in appearance.
- Annually, there are two generations (fall and spring); the fall generation is more important economically.
- Look for the larvae and puparia (called flaxseed) between the leaf sheath and stem base.
- Use of the fly-free planting date (Oct. 1 for northern Missouri to Oct. 18 in southeastern Missouri) and varieties resistant to Hessian flies are the most effective management tools.

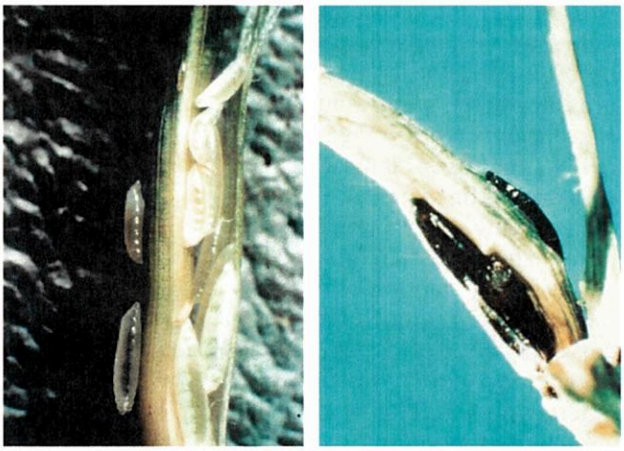

Figure 1. Hessian flies overwinter as larvae (left), which develop protective shells, or puparia, called flaxseed (right).

Damage

The maggots are the only stage that damages wheat since the adults do not feed. A single maggot feeding on

Approximate timing for Hessian fly infestations in Missouri.

"Flaxseed" wintering	1st generation	Plants damaged and "flaxseed" in stubble	2nd generation and "flaxseed" at plant base	"Flaxseed" wintering	Plants fall to tiller
January – March	April and May	June and July	August – October	November	December

a plant for three days can stunt a young plant or tiller. In the fall, maggots usually feed on the lower leaves and can cause heavy damage. Infested plants become stunted and stiffly erect, and leaves are thickened with a bluish green color. Heavily damaged plants usually die during the winter. Plants damaged during the spring have similar symptoms to those damaged in the fall; however, heavy parasitism (more than 95%) usually limits damage during the spring. As the seed heads begin to fill, heavily infested plants will lodge and yields can decline by at least 16 bushels per acre.

Scouting procedures and techniques

When entering a field to check for Hessian fly infestations, identify areas with poor stands or the presence of stunted plants. Closely examine the basal part of the plant (first and second nodes) by pulling the leaf sheath away from the stem to locate the maggots or "flaxseed." It is important to examine several plants in different parts of a wheat field.

Management

Insecticides generally are not recommended for Hessian fly control because of the difficulty of properly timing applications. Applying an insecticide would be helpful when other pest insects (e.g., aphids and grasshoppers) are present along with Hessian flies. ***Precaution:*** **Before you select and apply an insecticide, review the manufacturer's label for information on safe use of the material.**

Several cultural practices are effective in preventing or managing Hessian fly infestations:

1. Delay planting of wheat until after the fly-free date in your region (Figure 2) to lower the wheat's susceptibility to Hessian fly infestations. After these dates, most adult Hessian flies die before the crop emerges and therefore cannot lay eggs.

2. Destroy volunteer wheat. Unless all volunteer wheat is destroyed, Hessian flies are stimulated to break their summer hibernation and potentially produce another generation. Once wheat is harvested in the spring, plowing under the stubble is preferred over burning. This buries the "flaxseeds" and limits the number of adults that escape from the ground.

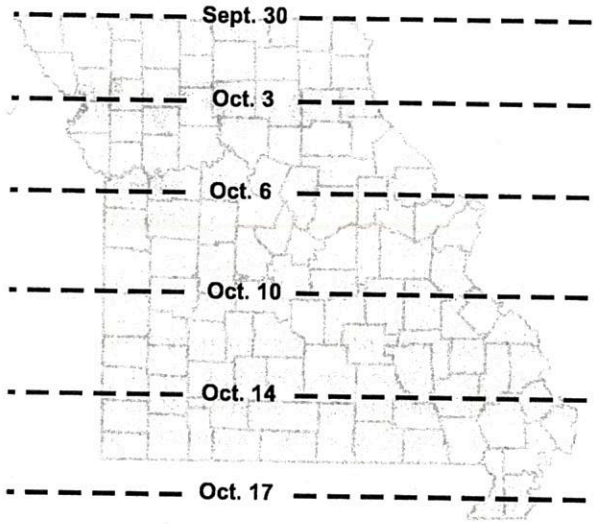

Figure 2. Fly-free dates for Missouri. Wheat seeded on or after these dates should escape damage from Hessian flies in the fall.

3. Avoid the overuse of nitrogen fertilization so wheat will not produce an overabundance of vegetative growth. This approach provides less food for the Hessian fly.

4. Plant certified seeds of varieties resistant to the different biotypes (A to L) of the Hessian fly (Figure 3). Note that a single variety is not resistant to all biotypes and currently no variety has resistance to the biotype L.

5. Practice crop rotation. This is an effective management tool because of the insect's limited host range.

Figure 3. Plants infested with Hessian flies become stunted and thickened (left) whereas resistant varieties (right) resist attack.

Photo credits: G. Dave Buntin, University of Georgia.

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