AGRONOMIC Spotlight
Technology Development by MONSANTO ®

Agronomics for Prevented Planting Acreage

Excessive rainfall has resulted in several acres being claimed under prevented planting. There are several details about prevented planting coverage that should be discussed with your crop insurance professional. Once the decision has been made to file a claim for prevented planting on acreage eligible for a prevented planting payment, then agronomic decisions need to be made involving weed control and possibly cover crops.

When a prevented planting claim is made, the field still has to be managed for future crops. If corn will be planted the following year, the risk for fallow syndrome, weed control, and erosion may need to be managed, with a cover crop being one viable option.

Fallow Syndrome in Corn: Symptoms and Causes

Phosphorus (P) or zinc (Zn) deficiency, and reduced early growth, are common symptoms of corn suffering from fallow syndrome. The deficiencies are often not related to the amount of available P and Zn in the soil, but rather a decrease in vesicular arbuscular mycorrhizal fungi (VAM) populations. VAM is a beneficial fungus found in the soil, that has a symbiotic relationship with corn. VAM prospers by capturing the energy it needs from corn roots, while corn benefits because VAM acts as an extension of corn roots, helping them absorb additional nutrients (especially P and Zn) and moisture for corn growth.

VAM populations decrease significantly when there is no host present. Most agricultural plants, even most weeds, can be hosts for VAM. Brassica species (e.g. canola, cabbage, broccoli, etc.) and sugar beets are the exception and are not good hosts for VAM. Therefore, fallow syndrome is most common when corn is grown in a year following fallow and/or flooded conditions, or a non-host crop.

VAM populations increase upon growth of corn or another host crop. The time it takes for VAM populations to rebound is relative to the extent of the previous decline in the population. The effects of fallow syndrome can be seen the year following an event, such as a flood, that causes a decrease in VAM populations. After a subsequent season with normal growing conditions and a successful host crop, the symptoms of fallow syndrome are less likely to occur.

Fallow Syndrome: Effect on Yield Potential

There is limited information available that explains the potential yield loss from fallow syndrome. In a trial conducted in Iowa and Missouri in 1994, corn was planted into fields that were fallow due to floods the prior year. The crop received only 25 pounds P/acre in starter fertilizer, showed P deficiency symptoms, and yielded 32 bu/acre less than the non-flooded field. When 60 to 80 pounds P/acre were applied as a starter fertilizer, the yield penalty from low VAM populations ranged from 7 to 16 bu/acre and plants did not exhibit any P deficiency symptoms.

Figure 1. Stunted, purple corn due to the plant being deficient in phosphorus is a common symptom of corn with fallow syndrome.

Fallow Syndrome: Management Options

Plant a Cover Crop. Planting a cover crop provides a host for VAM to reproduce. Healthier cover crops generally result in a greater increase in VAM populations. Therefore, planting a cover crop as early as feasible is preferred. However, if it is not possible to plant a cover crop in mid-summer, one planted in late summer or early fall can still help increase VAM populations. Brassica crops, which are an extremely poor host for VAM, should not be used as a cover crop if the intention is to raise VAM populations.

Band P with Starter Fertilizer. P is a relatively immobile nutrient in the soil. Broadcasting P has little value to help minimize the effects of fallow syndrome. Applying 60 to 80 pounds P/acre as a starter fertilizer can help overcome the effects of fallow syndrome. That rate is equivalent to approximately 16 to 21 gallons of 10-34-0 fertilizer. When applying these high rates, the starter should be applied using a 2x2 placement (2 inches below and 2 inches to the side of the seed row), not in furrow.

Inoculants. VAM fungal inoculants are generally not feasible based on availability and cost.

Planting a Different Crop. While most crops are hosts to VAM, some crops are more tolerant to low VAM populations. Soybean and sorghum show less of a negative response to

to pg. 2

from previous page

Agronomics for Prevented Planting Acreage

low VAM populations and may be a viable option.

Weed Control Basics

It is important to manage weeds, prior to going to seed, on prevented planting acreage for the following reasons:

- Minimize growth of the weed seed bank,
- Minimize use of nutrients for production of weed seed, versus for crop growth as intended.

There are several options for weed control including one or more of the following: herbicides, tillage, cover crops, and mowing. Any of these tools should be employed prior to weeds setting seed.

Weed Control: Herbicides

There are different herbicide options depending on if a cover crop will be planted. If considering a cover crop, then a burn down and possibly an in-crop application might be options. If no cover crop will be planted, then additional herbicide options are available and annual maximum use rates have increased relevance.

Due to effectiveness and economics, Roundup® brand agricultural herbicides, 2,4-D, and dicamba are common herbicide options for prevented planting acreage. All three herbicides can be used as a burndown prior to certain cover crops, but Roundup® agricultural herbicides have the least restrictive plant-back restrictions (Figure 2). The plant-back restrictions are related to if the crop is on the herbicide label (Figure 3).

Weed Control: Tillage

If considering a cover crop, tillage alone can be highly effective on small weeds and has no plant back restrictions. If weeds are larger, tillage can be used in conjunction with a herbicide burndown to increase control. Ideally, the herbicide would be applied, absorbed and translocated to the growing points, prior to tillage. For most perennial weeds and weeds under stressful conditions, waiting 5 to 7 days after the herbicide application to perform tillage can help improve weed control by allowing time for translocation. Good growing conditions can reduce the time needed for herbicide translocation. While good weed control of annual weeds in favorable growing conditions is possible with only 1 day between application and tillage, waiting 5 to 7 days reduces the risk of inconsistent weed control. If tillage has been done, time has passed, and a herbicide burndown will be applied, please note that large weeds might not have been controlled with tillage, but rather injured and may regrow (Figure 4). This can result in misjudging weed height due to part of the weed being buried below ground.

Figure 4. Weed injured by tillage and allowed to regrow.

Using tillage for season-long weed control, may be detrimental to soil health. Tillage can break up compaction in the tillage zone, but it can also create a layer of compaction underneath the tillage zone. Also, the repeated trips across the field with heavy equipment generally does not help compaction. Leaving the field fallow and weed free with tillage also increases the risk for wind and water erosion, as well as deterioration of organic matter as the soil is constantly being exposed to the elements. Additionally, with minimal weed

Figure 3. Cover crop[4]/herbicide combinations that can have plant-back restrictions of 0 to 45 days. See Figure 2 for additional details.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS

Roundup® Agricultural Herbicides	2,4-D	Dicamba
Legumes		
Alfalfa		
Berseem clover		
Cowpea		
Crimson clover		
Field peas		
Hairy vetch		
Mung beans		
Red clover		
Soybean		
Sweetclover		
White clover		
Non-Legume Broadleaves		
Buckwheat		
Flax		
Grasses		
Annual ryegrass	Annual ryegrass	Annual ryegrass
Barley	Barley	Barley
Japanese millet		Japanese millet
Pearl millet		Pearl millet
Oats	Oats	Oats
Sorghum sudangrass	Sorghum sudangrass	Sorghum sudangrass
Sudangrass	Sudangrass	Sudangrass
Wheat	Wheat	Wheat
Brassicas		
Mustards (black, brown, field, white)		
Kale		
Turnip		
Winter canola		

to pg. 3

from previous page

Agronomics for Prevented Planting Acreage

Figure 2. Characteristics of three common herbicides used for burndown and/or fallow situations.

Characteristics	Roundup® Agricultural Herbicides	2,4-D	Dicamba
Maximum Annual Application	5.3 qts./a	For fallow, 2 applications/year, minimum 30 days between applications. 4.2 pts./a (2 lbs. a.e./a).	64 oz./a
Rate Structure	< 6" = 22 oz./a* 6-12" = 32 oz./a >12" = 44 oz./a	Annual weeds = 1-2 pts./a Biennial weeds = 2-4.2 pts./a Perennial weeds= 2-4.2 pts./a Wild onions and garlic= 4.2 pts./a	Annual weeds: Small actively growing 8-16 oz./a Established weed growth 16-24 oz./a Biennial weeds: Rosette diameter 1-3" 8-16 oz./a Rosette diameter >3" 16-32 oz./a Bolting 32-48 oz./a Perennial weeds: Top growth (TG) suppression 8-16 oz./a TG control and root suppression 16-32 oz./a TG and root control** 32-64 oz./a
Additives	8.5-17 lbs./100 gal. spray solution	COC 1% v/v. or NIS at 0.25% v/v	See label
Plant-back Restrictions	Labeled crops: none Other crops: 30 days	Labeled crops: within 29 days after application. Labeled crops may be at risk of crop injury or loss if planted soon after application, especially the first 14 days. Degradation factors should be considered. Other crops: may be planted 30 or more days after application without concern for illegal residues in the planted crop. However, there may be a risk for crop injury to susceptible crops. Under normal conditions, any crop may be planted without risk of injury if at least 90 days of soil temperature above freezing have elapsed after application. Degradation Factors: risk of crop injury is less with lower use rates and/or warm moist soil conditions that favor rapid break down of 2,4-D.	<=24 oz./a - Barley, oat, wheat, and other grass seedings: 15 days per 8 oz./a applied east of the Mississippi River and 22 days per 8 oz./a west of the Mississippi River. <=24 oz./a - Crops not on label: 120 days >24 oz. & up to 64 oz./a - Barley, oat, wheat, and other grass seedings: 30 days per 16 oz./a east of the Mississippi River and 45 days per 16 oz./a west of the Mississippi River >24 oz. & up to 64 oz./a - Crops not on label: 120 days in areas with 30" or more of annual rainfall and 180 days in areas with less than 30" of annual rainfall Soybean (4-16 oz./a and only where annual rainfall is 25" or more): Rainfall accumulation of 1" needs to occur prior to starting the waiting interval of 14 days for 8 oz./a or less, and 28 days for up to 16 oz./a.

Notes: *rates based on 16-40 gallons per acre spray solution
** see label for specific rates for various species

to pg. 4

from previous page

Agronomics for Prevented Planting Acreage

growth, the risk for fallow syndrome in corn is greater.

Weed Control: Mowing

Larger weeds can be managed with mowing versus tillage, but weeds should still be controlled prior to setting seed. Mowing can be used in conjunction with tillage or herbicides. For most perennial weeds and weeds under stressful conditions, waiting 5 to 7 days after the herbicide application to mow can help improve weed control by allowing time for translocation. Good growing conditions can reduce the time needed for herbicide translocation. While good weed control of annual weeds in favorable growing conditions is possible with only 1 day between application and mowing, waiting 5 to 7 days reduces the risk of inconsistent weed control. Additionally, mowed weeds will be older and more hardened off than what the height would indicate so rates should be adjusted accordingly. The risk for erosion and fallow syndrome in corn would likely be less with mowing versus tillage. The key to mowing is making sure it is truly done prior to weeds setting seed.

Cover Crops. Erosion can be minimized with the use of a cover crop. Additionally, a cover crop can often aid in weed control. There are several species that are classified as cover crops, and the pros and cons for each species vary greatly.

Cover Crops: Selection

There are a wide variety of choices to consider for cover crops. Several educational resources are available. Most of the information regarding cover crops in this document is based on information from a book titled "Managing Cover Crops Profitably, Third Edition", by Andy Clark, published by the Sustainable Agriculture Network. It is available in various locations, including through the Midwest Cover Crops Council website, www.mcc.msu.edu.html, and clicking on 'Publications'. This book, local extension agents, and websites such as the Midwest Cover Crops Council website, can help to determine what, if any, cover crop fits your needs.

Cover crops fall into four basic categories: grasses, legumes, brassicas, and non-legume broadleaves. There are several benefits of cover crops and species vary in terms of which benefits they are able to provide. Some of the key benefits of cover crops include: 1) providing nitrogen (N), 2) adding organic matter, 3) improving soil structure, 4) reducing soil erosion, 5) providing weed control, 6) managing nutrients, or 7) providing moisture-conserving mulch. If your goal is to maximize the green manure benefits of a cover crop while minimizing the use of soil moisture, it is recommended to plow down prior to full-bloom[6]. One of the first steps to determining which cover crop will work for you is to identify which 1 or 2 benefits are the most important to you.

Questions To Consider When Deciding On Which, If Any, Cover Crop Would Fit In Your Operation:

- What are the primary goals for the cover crop?
- Which types of cover crops are most likely to fit those goals? (Keep in mind, mixtures are also an option.)
- How likely is it to turn into a weed problem?
  - Is it a perennial, biennial, or annual?
  - Is it a prolific self seeder?
  - Are herbicides commonly used effective for control of the cover crop once it is to be removed?
  - Is it easily controlled (or spread) with tillage?
  - Does it spread with rhizomes or stolons?
- When will it be planted? Can it tolerate being planted in the summer? Can it tolerate wet or dry soils?
- How will it be seeded?
- Will it winterkill or will it need to be controlled this fall or next spring?
- Will it help support VAM to help limit fallow syndrome in corn? Brassicas are poor hosts for VAM.

Summary

1) Fallow Syndrome: Weigh cost of potential yield loss next year with cost of cover crop, starter fertilizer, or planting beans.
2) Weed Control: Main goal is to minimize growth of the weed seed bank by removing weeds prior to seed set. There are several options to do so. If using herbicides, please remember to consider plant-back restrictions if planting a cover crop.
3) Selecting a Cover Crop: Determine your primary goals and utilize information resources to help decide which, if any, cover crop with help attain your goals.

Sources:

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