

Indiana Drought Fact Sheet for: Cover Crops and No-Till

2012 Drought Overview

As drought conditions worsen in Indiana, NRCS has developed a plan to communicate information and resources to keep you informed about programs and services that can benefit you.

As of today, Indiana is the worst hit of the major corn and soybean states. Reports from every corner of the state indicate moderate to severe conditions comparable to the 1988 drought. Combined with days of heat stress, crops are quickly showing signs of failure. Areas in the Northeast and Southwest are the hardest hit and are considered severe. A number of areas in the state have received spotty precipitation (mainly in the Northwest and Southeast), but not enough to significantly improve growing conditions. Some of these areas where rain has fallen have also received high wind and hail damage.

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2012 had the mildest winter and warmest spring on record followed by the current summer drought. Most cover crops broke dormancy two to three weeks early and many that weren't supposed to survive the winter did. Timing the termination of the cover crops was difficult to predict. Those that killed cover crops early ahead of corn may have an advantage this year.

Scavenging Nutrients

Scavenging nutrients is a great use of cover crops. Their role is to take up nutrients in the fall and keep them from leaching away. In 2011-12 they did exactly what we want. With little moisture this spring and summer, most of the nutrients are still being held in the dead, but not decomposing, plant tissue. This nutrient tie-up is more pronounced in cover crops that were allowed to grow for a longer time. The good news is these nutrients are still on the farm.

Many farmers follow sound management by applying side dress nitrogen after corn emergence; however, this year they may be paying a penalty. Drought conditions may have a significant effect on corn's utilization of nitrogen. In a drought, roots have little capability to go searching through dry soil for nutrients or water. Normally, nitrogen either moves to the roots in solution as nitrate or roots grow through moist soil to intercept the nitrogen. In 2012 conditions, most roots never had access to the applied nutrients. Additionally, the nutrients that are normally biologically cycled from soil and released to be taken up in solution had no water to form a solution.

There is consensus among Purdue University scientists and NRCS agronomists that much of the nitrogen applied to corn will go unused this year. This is precisely the type of year we need a cover crop, to trap the much larger residual nitrogen that will be present after a poor corn crop. Numerous studies have shown the highest nitrogen losses occur after a dry year.

Many crops will be harvested or destroyed early. If we begin to get some moisture, there could be an opportunity to seed a fall forage crop mix such as oats with turnips or brassicas that would use the surplus nitrogen and possibly fill a need for forage. This cover crop mix would hold nitrogen, keeping it available for the next crop.

It may also be a year to consider adding a winter small grain to the rotation. Planting wheat or barley will use surplus nitrogen after corn and could provide early summer feed for livestock. If 2012 remains dry into the fall, it is very likely that a high percent of applied nitrogen will remain unused. If a cover crop can be established to sequester the nitrogen, and shorter than normal stalks are less of a problem, then no-tilling corn back after this year's corn may be a good use of the conserved nitrogen.

Conserving Moisture

Cover Crops will use and transpire moisture in the spring. This is usually a good thing in a normally wet Indiana spring. This year, many cover crops were terminated after the last rain fell, leaving the soil very dry. Most years the cover crop helps conserve moisture from late spring rains to help crops through the more normal dryer summer. The soybean crop and some corn may still receive that benefit this year.

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Grazing of Cover Crops

A major concern with the 2012 drought is the lack of available quality forage. Indiana NRCS has the flexibility to allow holders of EQIP contracts to graze cover crops (Practice 340) for forage due to the drought conditions. Cover crops grazed for forage must be managed under a prescribed grazing plan.

Producers are responsible for checking that their crop insurance policy allows cover crops to be used for forage.



No-Till

It is important when considering any positive or negative impact from no-till, that 2012 is far from a normal growing season. Spring droughts are extremely rare. 1988 was the last time most of us can remember, but with the prolonged heat, 2012 is really more like the droughts of the 1930s.

You may have noticed some conventionally tilled corn actually looking better than no till or no till with cover crops this year. Keep in mind much of that has to do with when it was planted and when (of if) the next rain fell.

This year, some are reporting no-till fields have an apparent poorer status (short, yellow, etc.) when compared to conventional-till fields. Probable contributing factors are:

- The tilled fields had a flush of microbial activity after tillage, releasing a considerable dose of nutrients while there was still SOME moisture in the soil, and thus were available to plants early on.
- The no-till does not have this early flush of nutrients, but has a more gradual increase in soil respiration and would normally be releasing the nutrients as the increased soil biota becomes active. This is usually a positive, since the release is more in line with greater crop demand. But this year, the hot dry weather hit very rapidly and, biological organisms that cycle nutrients went dormant. This caused the decomposition of organic matter to be very slow and nutrients were not released.
- No-till will almost always have slower root growth and development in the early season, but tends to catch up later. It is quite possible that suppressed root growth in no-till has to do with soil resistance to root penetration being much higher in the top six to eight inches of no-till fields this year following a wet fall and a warm winter with almost no freeze-thaw loosening.
- We know that nutrients, under no-till, tend to be concentrated in the top two to three inches of the soil. By the time of emergence the top two inches of soil was very dry making access to the most nutrient rich zone of the soil by the nodal (feeding) roots impossible.
- Some no-till was planted in soil that was a little moist and had zero rain thereafter. This resulted in very limited lateral root growth due to slight sidewall compaction.

The overall soil health and the amount of time in a *conservation cropping system* has a lot to do with the crop health. Most of the conventional corn that looks better was also the earliest planted. Where no-till was planted early, and received a rain or two after it came up, the corn looks pretty good as well, especially if nitrogen was applied early.

Long term benefits from improved soil health such as increased water holding capacity, improved water infiltration and enhanced nutrient cycling should lead to a more resilient cropping system during a wide array of extremes in weather. Healthy soil will provide multiple pathways for crops to access the needed resources. Continued pursuit of higher soil function should be a fundamental goal to achieve high production and a healthy environment.