2012 Drought Overview
As drought conditions hit Indiana, NRCS developed a plan to communicate information and resources to keep landowners informed about programs and services that could help.

Indiana was one of the worst hit of the major corn and soybean states. Reports from every corner of the state indicated moderate to severe conditions comparable to the 1988 drought. Combined with days of heat stress, crops quickly showed signs of failure. Areas in the Northeast and Southwest were the hardest hit and considered severe. A number of areas in the state received spotty precipitation late in the summer (mainly in the Northwest and Southeast), but not enough to significantly improve growing conditions. Some of these areas where rain fell also received high wind and hail damage.

Introduction
The persistent drought through the Midwest began well before the summer of 2012. Brutal heat and record low rainfall as early as July of 2011 continued into one of the mildest winters and warmest springs on record in 2012. It was followed by a record heat and drought during the summer of 2012, lasting through crop maturity. Crop and forage production have been severely impacted. These conditions will have long term effects on soil organic matter and soil biology, which play significant roles in nutrient cycling, water infiltration and water holding capacity. The functions of the soil make up the soil’s health. While these prolonged conditions cause the health of soil to suffer, farmers who have managed for high soil health leading up to severe drought will fare better than others. For these farmers, healthy soil delivered what the sky could not – moisture to their thirsty crops. And now at harvest time, while many farms are averaging only 40 to 50 bushels of corn per acre, many reports from farmers with soil health management systems are averaging two to three times that. Most attribute the crop resilience to the health and vitality of their soil, due to long-time use of no-till and cover crops in their operation.

Soil Health Strategies and No-Till
It is important to recognize that 2012 was far from a “normal” growing season. Spring droughts are extremely rare in the Midwest.

Scientific literature clearly shows an advantage in nutrient cycling, water infiltration and water holding capacity with increased levels of organic matter, which is provided by no-till management systems. The literature also indicates increased loss of soil carbon as tillage intensity increases. Even minimal soil disturbance in a corn-soybean rotation will usually result in a net loss of soil carbon. No-till and cover crops can reverse that trend.

Studies also demonstrate that each tillage pass results in an average loss of 0.5 inches of water from the soil. When it comes to tillage and soil moisture, less is more. Each additional percent of organic matter in the soil has been shown to increase the water holding capacity equivalent to 0.5 to one inch. Imagine what one inch of water in mid to late July could have meant for corn yield.

The overall soil health and the amount of time in the Conservation Cropping System have had a lot to do with the crop health during a drought.

Long term benefits from improved soil health such as increased water holding capacity, improved water infiltration and enhance 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 if we are to achieve high production and a healthy environment.
Nutrient and Soil Health Strategies with Winter Covers

Many farmers follow sound management advice by applying “side dress” nitrogen after corn emergence. This year, however, they paid a penalty for this practice. Drought conditions may have a significant affect on corn utilization of nitrogen. Roots have little capability to go searching through dry soil for nutrients or water. Nitrogen either moves to the roots in solution as nitrate, or roots grow through moist soil to intercept the nitrogen. The 2012 conditions have resulted in roots that have not accessed the applied nutrients. In addition, the nutrients that are normally biologically cycled from the soil and released to be taken up by the roots in a liquid solution had no water to form a solution.

Purdue University and NRCS are sharing a united message that much of the nitrogen applied to corn went unused this year, and remains in the soil. This year a cover crop is more valuable than ever, as it can trap the much larger residual nitrogen pool that is in the soil. Indiana farmers are heeding this advice, and we have seen the largest acreage of cover crop seeding in recent history. In a two week emergency drought sign-up period, Indiana NRCS received over 22 million dollars in requests for cost-share assistance to seed cover crops.

Many crops were harvested or destroyed early this year. Now that some moisture has returned, the conditions are ripe for seeding cover crop mixes (with species such as oats, cereal rye, forage radish or others) to utilize surplus nitrogen, provide needed forage, and/or to convert excess nitrogen into protein to rebuild soil organic matter.

Many farmers have also added a winter small grain to their rotation. Planting wheat or barley will utilize surplus nitrogen after corn, and provide early summer feed for livestock, which remains in short supply due to the drought.

Strategies for 2013 & Beyond

Farmers should do as little tillage as possible. Unfortunately, with uncertainty about disease, crop insurance requirements and sheer frustration from an enduring drought, many soils have been tilled already. If we face similar weather in 2013, moisture conservation through the winter will be critical. Establishing a cover crop will sequester nitrogen, improve water infiltration, and provide mulch on the soil surface. No-tilling corn after this year’s corn may be a good use of the conserved nitrogen or, at a minimum, the soybean crop has a much greater reserve of resources.

Innovative farmers in Indiana are in relentless pursuit of soil health. They have seen increases in soil organic matter of two to three percent. They consistently exceed the county average yield by 20 percent or more, and continually improve the water, air and wildlife habitat on and around their land. Broad adoption of these Conservation Cropping Systems, that continually improve soil health, will help to meet the increasing food, energy and environmental demands on U.S. Agriculture.