



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

Hardin County Extension News Release

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Heavy Rains Challenge Corn and Soybean Crops

Hardin County – Hardin County has recently experienced heavy rains in the past week. Producers may have concerns about nitrogen loss in cornfields. Nitrogen losses occur by two main pathways: de-nitrification, which is gaseous loss of nitrogen, and leaching of nitrate from the soil through water leaving the tile line or into groundwater. There is no tool or test that can tell us how much has been lost. An estimate can be made on the loss potential, which is based on the nitrogen source, time of application, soil temperature, and number of days that soils have remained saturated.

Most nitrogen that is lost from a field is in the nitrate form during wet conditions. The time of transformation to nitrate is dependent on the type of nitrogen fertilizer applied. Anhydrous ammonia is less susceptible to loss since it converts to nitrate rather slowly. Urea-ammonium nitrate (UAN) solution, or 28-N as it is commonly called, has about 25% as nitrate at application time so it has a greater risk for loss than anhydrous ammonia.

Soils have been warm enough that some transformation to nitrate may have already occurred this year depending on application date. However, the nitrate nitrogen will not be lost by de-nitrification unless soils have remained saturated long enough. Risk of loss is minimal for soils that remain saturated for one day, moderate risk for two days of saturation, and a substantial risk for three or more days of saturated conditions. Standing water is evidence of saturated soils, but even soils without standing water are considered saturated if an individual cannot walk across without making footprints.

The heavy rains have also been tough on soybeans. In fields that have had standing water for more than 48 hours, a person will notice stunted soybeans and a smell as they approach the drowned out areas. After digging the roots up, they may or may not be brown, but the trick is that the outer layer of the root tissue, the cortical cells, can be easily pulled off leaving the white center of the root or root stele. These roots almost look like rat tails.

When plants are completely underwater for approximately 24–48 hours under high temperatures greater than 80°F, they will likely die. Plants respire more under high temperatures, oxygen is depleted, and carbon dioxide builds up suffocating the plant. Cool, cloudy days and cool, clear nights increase the survival of a flooded soybean crop. If the waters recede quickly and the plants receive some light rain, they can recover.

Yellow soybeans that can also be somewhat stunted are often an indication of poor nodulation. Nodules are the small knots found on roots, often near the top of the root system. Nodules are the result of a symbiotic relationship between soybean and bacteria. These bacteria convert nitrogen into a form that is usable by the soybean plant.

Nodulation is reduced in wet soils. Soybeans grown in saturated soils for two weeks retain the ability to recuperate nodule function when normal (aerobic) conditions are restored if they were at the growth stage with two tri-lobate leaves (V2). To determine if a nodule is actively fixing nitrogen or converting nitrogen to a usable form, the nodule can be split with a fingernail to examine the inside. If the inside of the nodule is pink or red, nitrogen is being fixed.

Flooded and saturated soil conditions are also more at risk for disease, providing the optimum conditions for the water molds that are common across the state. In these cases, the whole roots are brown, sometimes with dark brown lesions on the roots, and the tissue can be brown to tan. Both *Phytophthora sojae* and *Pythium* are contributing to this problem.

Once the soybeans are at the V2 growth stage or greater, the protection from the seed treatment is gone. In this case the soybean plant is relying on its defense system to lessen the damage. For areas in Ohio, the genes for *Phytophthora* resistance will only protect a few of the plants; therefore leaving the producer to rely on the partial resistance such as the field resistance or tolerance part of the package.

When dryer weather returns the roots will re-establish. The roots just need some oxygen to get moving again. While the producer is waiting for this to happen, it is a good time to check field drainage, as these are excellent opportunities to see where some improvements can be made. (CORN 2015–17)