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Side-hill seeps result in corn emergence problems

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Abstract

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Keywords

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Integrated Crop Management NEWS

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Side-hill seeps result in corn emergence problems

By Roger Elmore and Mahdi Al-Kaisi, Department of Agronomy

Iowa's wet spring and cool temperatures not only slowed [planting progress](#) but also slowed [Growing Degree Day accumulations](#). These factors contributed to [yellow corn plants](#) across the state as well as within-row variability in plant to plant growth and development. [Seedling diseases](#) reduced stands.

We might expect all of those problems to surface considering the conditions the crop has experienced to date. We expect stand losses in low areas of fields in wet years due to prolonged standing water on planted or emerged corn ([see link](#)). However, one rarely seen problem has developed: corn stand losses on side hills.

Saturated soils result in reduced corn stands

Saturated soils on sloped areas (Figs. 1 and 2) with corn planted in the second or third week in May resulted in poor germination and damping off and, in some cases, dramatically reduced stands. Soil temperatures at and soon after planting were conducive for rapid germination and emergence. So, we can rule out temperature as a causal agent. In some cases, the seed swelled (imbibed water) but neither the [radical nor mesocotyl emerged](#). In cases where the radical and/or mesocotyl did emerge, they died before much growth occurred (Figure 3). (Colleagues at the [Plant and Insect Diagnostic Clinic](#) are examining seedlings for pathogens as we write.)

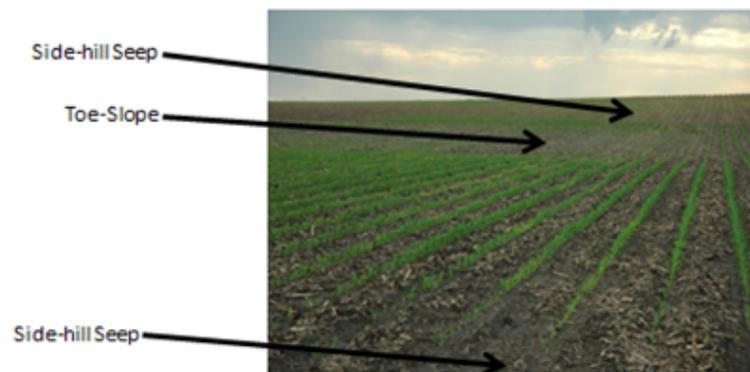


Figure 1. Field with reduced stands on side hills due to saturated soils (foreground and just below the crest of the hill in the background). the field slopes down in the foreground to the lowest area, which ponded and has no surviving plants (toe slope), and then back up the other side. Boone County, June 11, 2013.

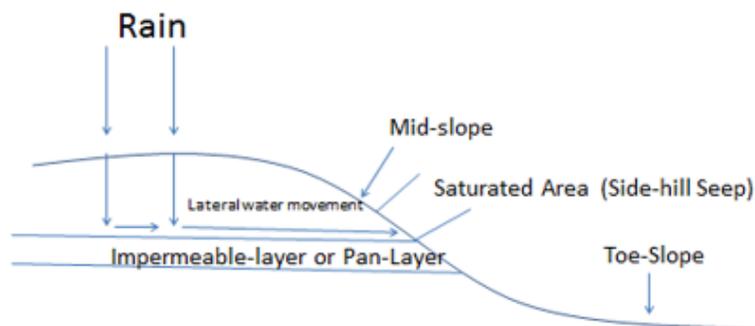


Figure 2. A cross-section of sloped field with potential side-hill seepage.



Figure 3. Seedling that succumbed in saturated soils prior to emergence. Boone County, June 11, 2013.

One of the possible reasons for stand losses on side-hill slopes, also known as the mid-slope (Fig. 2), is water seepage leading to continuously saturated conditions and thus a lack of oxygen supply for seedlings to develop. Areas with water seepage like this are called 'side-hill seeps.'

Side-hill seeps described

One of the main reasons for side-hill seepage is existence of an impermeable layer or pan layer that restricts vertical water movement into the soil profile (Fig. 2). Also, in some cases it can be related to lateral flow where a layer of sand and gravel sandwiched between glacial debris channels water to the side- or mid-slope. This impermeable layer probably lies just below the area where the emergence failure occurred.

One of the practices to alleviate problems in areas with side-hill seepage is planting deep-rooted perennials. Either alfalfa or perennial grasses will reduce soil moisture and prevent potential saturated conditions in seep areas. Reduced or no-till alleviates the problem as well.

Higher pH soils in saturated areas?

The potential for higher pH soils in saturated areas exists in addition to issues with stand establishment. Generally, water associated with side-hill seeps is high in dissolved minerals such as calcium and may create an alkali condition. If highly dissolved salts exist, salinity may result in crop failure in these seep areas. Continuous row cropping in these areas may reduce soil quality and increase soil erosion and water ponding conditions at the lower portion of the slope length - the toe-slope (Figure 2).

Summary

Extensive spring 2013 precipitation fostered ideal conditions for side-hill seeps. Soil profiles were saturated and excess water moved laterally due to downward vertical flow restrictions. This soil saturation occurred during critical stages of germination and early stages of growth. These conditions deprived seedlings of oxygen necessary for growth and/or slowed growth to the point where pathogens were able to overcome the struggling seedlings. Corn stands were compromised.

Evaluate field conditions during wet conditions and document areas with side-hill seepage. Develop a management plan that may include conservation tillage, use of no-till, tiling, and/or planting perennials with deep roots to utilize excess moisture. These practices will help alleviate side-hill seep problems in the future.

This article expands on an Iowa Farmer Today [Crop Watch Blog](#) posted on June 13, 2013.

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