Alleviate Soil Crusting with a Rotary Hoe

- Dense soil crust can form when water subsides from saturated or flooded soils.
- Surface crusting increases the risk of failed emergence in both corn and soybean.
- A rotary hoe is a useful tool for breaking up the crust and aiding corn and soybean seedling emergence.

Formation of Soil Crust
Soil crust forms when fields begin to dry after heavy rainfall or flooding. When soil aggregates break down at the surface, the impact of raindrops can create a layer of soil that is without structure and turns into a cement-like crust at drying. Crusting tends to be a problem in fields that have weak soil structure. This includes fine textured soils and soils with low organic matter content. Conventionally tilled fields and those lacking adequate residue cover are also at a greater risk for crusting. Residue can help prevent soil crusting by absorbing the impact of rain drops. This prevents the rain from damaging soil structure at the surface. Once soil structure is broken down, corn and soybean germination and emergence can be negatively affected.

Effect of Soil Crust on Crop Growth
When dense surface crust forms above seed, germination and emergence can be inhibited. Soybean emergence is prevented when the hypocotyl is broken as it pushes against the hard crust. If soybeans are able to penetrate the crust or emerge through a crack in the crust, cotyledons may be lost as the seedling tries to pull them through the hard soil surface (Figure 1). Development of these seedlings may be slowed due to the loss of energy reserves found in the cotyledons.

While corn is generally better able to tolerate soil crusting than soybean, crusting can lead to uneven corn emergence. When corn seed is trapped beneath soil crust, the coleoptile may be unable to penetrate the hard layer of soil. This results in the formation of a corkscrewed mesocotyl during elongation and eventually to leafing out underground if emergence is delayed long enough (Figure 1).

Management
A rotary hoe can be used to break up the soil crust and allow plants to emerge. When deciding whether or not to use a rotary hoe, compare the plants that have already emerged and could be damaged to the plants that you are trying to save. One method to do this is to set flags in an area of the field. One color should be used to designate plants that have emerged; a second color should be used to designate plants that are still underground. Run the hoe through the area and evaluate the plants. With soybeans, make sure that hypocotyls are not broken and that cotyledons are intact. Soybeans are particularly sensitive to damage as the crook emerges. Expect approximately a 1 to 2% stand loss from hoeing in corn. If corn is truly having difficulty emerging, this loss should be minor in comparison.

When using a rotary hoe, run the tractor at high field speeds of 8 to 10 miles per hour. Work the soil just deep enough to break the crust. Get off the tractor periodically as you go across the field to evaluate crop damage and check for stand loss. If stand loss is greater than 3 to 5%, consider slowing travel speed. To reduce crop damage and stand loss, operate rotary hoes when soil surface moisture is slightly above field capacity. This can decrease the risk of damage to crops and soil compaction. At field capacity, a handful of soil will crumble easily in your hand under minimum pressure and leave a small amount of moisture. Avoid running a rotary hoe in the morning when plants can be brittle. Wait until later in the day when plants are more pliable.

A rotary hoe is an effective tool for breaking up soil crust and rescuing plants. Timing is critical to avoid excessive seedling damage and achieve the intended result. Monitor fields that are susceptible to crusting and keep track of soil moisture levels to determine if and when use of a rotary hoe is warranted.

Sources:

For additional agronomic information, please contact your local seed representative.

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