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## Delayed Soybean Emergence and Cotyledon Loss

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Differing weather patterns across the state of Wisconsin this spring have left some growers extremely pleased with their soybean stands while others find themselves at various degrees of displeasure or disgust. In a previous article, I discussed [Predicting When Soybeans Will Emerge](#). The model described in that article does not take into account the physics behind soybean emergence in compacted or crusted soil environments. Soybean emergence in tough environments like these can lead to low or variable stands, cotyledon loss, plant injury, or plant death.

To facilitate emergence in compacted or crusted environments, the soybean hypocotyl will swell to increase the force against the soil surface (Image 1). The force is sometimes too great and the hypocotyl snaps and the plant dies (Image 2). Other times, one or both cotyledons are broken off during emergence; however the unifoliolate (and thus the apical growing point) remains intact (Image 3). If a plant loses one cotyledon, yield loss would be negligible. However if both cotyledons are lost, a yield loss of 2 to 7% is possible. Though I have not seen this in 2010 in 2009, I noted several fields where the soybean had leafed out under the soil surface prior to emergence. When these plants emerged, the unifoliates appeared bleached. Once photosynthesis began these symptom quickly dissipated. (Image 4).

Given the significant variability in soybean emergence we are currently experiencing, the logical question that will arise is “*Will this variability in soybean emergence lead to yield loss?*”. It has been well documented by many corn agronomists that variability in corn emergence can cause yield loss (Please see [Trouble with Doubles, Gaps and Peepers](#) by Joe Lauer). Yield loss caused by variable soybean emergence however has not been quantified in soybean, though anecdotal reports and testimonials may indicate otherwise. Stands that are below a threshold of 100,000 plants per acre at harvest will lead to decreased yield.

**Image 1.** Swollen hypocotyl.



**Image 2.** Broken hypocotyl and plant death.



One way to mitigate stand loss due to crusted soils is to use a rotary hoe to breakup the crust as soybean are emerging. We have successfully used this implement for many years with very positive results. A small amount of damage to an existing stand of soybeans will occur when using a rotatoy hoe, however the benefits from breaking up the crust and allowing the soybeans to emerge will far outweigh the damage. Set the hoe to only breakup enough soil to allow the plants to emerge. Rotary hoeing can be delayed or eliminated if significant rain (usually over ¾”) is in the forcast when soybean seedlings are struggling to emerge. Planning appropriate tillage ahead of time can reduce the need for rotary hoeing and insure a good stand of soybeans. This includes not working the soil when it is too wet, using no-tillage systems, and not overworking the soil so that the structure remains intact. Most crusting and compaction problems arise from excessive tillage at the wrong time.

**Image 3.** Cotyledon loss due to crusted soil.



**Image 4.** Soybean plant that had leafed out under the soil surface prior to emergence.

