Soybean Survival from Spring’s Cold Snap
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April brought many warm days with excellent field conditions that allowed nearly 70% of corn and near 20% of the soybeans to be planted by the end of the month. As we enter May, temperatures have dropped and the water spigot has opened. The recent cold spells over the past weekend (~May 9th) raise concerns with cold injury to soybeans, especially in the northern third of the state. Some areas also experienced freezing temperatures around the 28th of April in east-central Indiana, though emerged soybeans were minimal at that point.

Will freezing air temperatures kill soybeans?
NO, if the soybeans had not emerged. Soybeans that had not emerged should not be injured from a cold snap since the soil and/or residue were “insulating” the seeds and developing seedlings. However, exposure to long periods of cold temperatures increases the risk of damage to soybean seedlings from diseases and insects.

YES (potentially), if the soybeans had emerged. Soybean seedlings exposed to freezing temperatures are more prone to injury than corn due to the growth patterns. The growing point of the corn plant is protected until about the V5 growth stage; whereas, the soybean’s growing point is exposed to the elements as soon as it emerges.

The first soybean part exposed to the air temperatures and the elements is the hypocotyl (lower stem) followed by the cotyledons (seed leaves). The hypocotyl pulls the cotyledons out of the soil and looks like a shepherd’s crook (Picture 1). The hypocotyl will straighten as the soybean seedling develops, which will lift the cotyledons up and “rest” them above the hypocotyl (Picture 2).
**Picture 1.** Emerging soybean seedling (shepherd’s crook): hypocotyl and cotyledons.

**Picture 2.** Emerged soybean seedling that has straightened.
What soybean part is injured due to the cold temperatures – the hypocotyl, the cotyledons, or the unifoliate leaves?

The soybean plant will die or is already dead if the hypocotyl is discolored or water-soaked (Plant B in Picture 3). The cotyledons and unifoliate leaves may still be green, but they will soon die or the plant will be “clipped off” as the hypocotyl deteriorates. However, the plant will likely survive if the hypocotyl and the cotyledons remain green even with dead unifoliate leaves (Plant A in Picture 3). The axillary buds will develop at the cotyledonary node since the apical bud, the growing point, is dead. Thus, the plant may develop split stems from this node (Picture 4). Each stem will grow and develop “normal” producing leaves, flowers, pods and beans, but the plant may be more prone to lodging later in the season.

Picture 3. Plant A has a green hypocotyl and cotyledons and will likely survive. Plant B has a discolored hypocotyl and water-soaked cotyledons and unifoliates, and it is dead. (Picture courtesy of Phil Walker, Planted April 7, 2010 near Columbia City, Indiana)
Soybeans have a tremendous ability to compensate for various plant to plant spacings (row widths and plant populations). In a recent article, we discussed the appropriate seeding rates to attain the target plant stand at harvest and ultimately, the appropriate plant stand to maximize yield and profitability. That target at harvest is approximately 100 to 120 thousand plants per acre. Plant stands as low as 40,000 plants per acre will have a yield reduction of 13% provided the weeds were controlled.

A field assessment of the plant stand is necessary to make the decision to replant. Cold injury can be spotty varying based on low lying areas, hills or knolls in the field, a wet hole, etc. Plant stands should be taken across the field with special attention to the areas that differ in stand. Secondly, plant stand counts should not include those dying/dead plants that we previously discussed. The goal is to assess the surviving plant stand, its yield potential, and the subsequent management decisions to maximize the productivity and profitability of the reduced stand vs. replanting.