Estimating Soybean Yields
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The early plantings coupled with moderate precipitation and temperatures allowed many Indiana soybean fields to grow and develop faster than the past five years. The rate of bloom and pod set has been about a week ahead of the five year average (Figure 1 – Pod Set). The rate of maturation should keep this pace and may even speed up due to the stresses of high temperatures and limited water during August. Extended periods of heat stress during seed fill can shorten the duration of seed fill and thus, hasten leaf drop and reduce yield potential. Sudden Death Syndrome (SDS) has added insult to injury. The cool and wet growing conditions during early vegetative growth provided a perfect environment for infection. Then, the hot and dry August completed the recipe for high SDS incidence (presence) and infection, especially in those early planted fields.

Figure 1. Pod Set in 2010 Indiana Soybeans (USDA-NASS, 2010).
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Fields planted early this spring with an early maturity group soybean started shedding leaves in the middle of August (Figure 2) and harvest will probably start by early September. Fourteen percent of Indiana’s soybeans were shedding leaves as of August 30 compared to 6% for the five-year average (USDA-NASS, 2010). The first noticeable leaf drop of soybeans usually precedes (ever so slightly) the beginning of physiological maturity (R7 – any pod that has turned the mature pod color, see Figure 3). In a general sense, we can estimate that approximately 14% of the soybean crop has begun physiological maturity and that in 10 to 14 days they will reach full physiological maturity (R8 – 95% of the pods have turned the mature pod color). Then, grain moisture could be less than 15% with another 5 to 10 days of good drying weather. As a frame of reference, soybeans in a green pod are around 65% moisture and soybeans in a freshly matured pod will be around 35% moisture.

Figure 2. Soybeans shedding leaves prior to first signs of physiological maturity (R7).

Soybean yield estimations improve with each day toward harvest. Soybean yields are based on the number of plants per acre, pods per plant, seeds per pod, and seed size. The number of seed-bearing plants can change substantially throughout the growing season even during late stages of reproductive development. Plant stands taken early in the season are good for seedling establishment, but stand counts are needed for current yield estimations. Soybean stresses (disease, insect, and namely weather this season) influence pod retention, seed development, and seed fill. Soybean yield estimates during the end of seed fill and the beginning of maturation will assist us as we prepare for harvest and marketing the crop.

Figure 3. The first pod has turned mature pod color, which is the beginning of physiological maturity (R7).
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1. **Determine the stand count of seed-bearing soybean plants.** Stand counts should be taken in 10 randomly selected areas of the field and averaged. Hula-hoop stand counts are cumbersome and damaging to soybean plants at this time of the year, so stand counts based on 1/1000th of an Ac are suggested. Narrow rows require greater lengths of a single row to estimate stand counts of 1/1000th of an Ac, so I suggest counting 2 or 4 rows at a length that is ½ or ¼ as long as the single row length (Table 1). Some plants may be present with few to no pods, and they should not be counted. Disease-infected plants, such as SDS, should be counted unless the severity was high enough to abscise most pods and/or stop seed fill.

   Table 1. Row lengths and number of rows to estimate stand counts.

<table>
<thead>
<tr>
<th>Row Width (in)</th>
<th>Number of Rows Counted to Equal 1/1000th Ac</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7.5</td>
<td>69 ft 8 in</td>
</tr>
<tr>
<td>10</td>
<td>52 ft 3 in</td>
</tr>
<tr>
<td>15</td>
<td>34 ft 10 in</td>
</tr>
<tr>
<td>20</td>
<td>26 ft 2 in</td>
</tr>
<tr>
<td>30</td>
<td>17 ft 5 in</td>
</tr>
</tbody>
</table>

   Calculate the average plant population → stand count x 1000 = ____________

2. Count the **# of pods per plant** on 10 randomly selected plants from each sample area. Any plant that was counted in the stand counts, including disease-infected plants or water-stressed plants, should be among the choices.

   Calculate the average pod # per plant= ____________

3. Calculate **pods per acre** by multiplying plant population by pods per plant.

   Line 1 × Line 2 = ____________

4. Calculate **seeds per acre** by multiplying pods per acre by 2.5 seeds per pod. Seed number per pod can vary due to growing conditions during reproductive growth, especially during flowering and seed fill. However, 2.5 seeds per pod has been a good estimate over the years. A more accurate estimate of soybean yield could be obtained by counting the number of seeds per plant and multiplying by line 1 (i.e., skip step 3 and enter seed number per acre directly). If the number of seeds per pod seem to be higher (potential of new higher yielding soybeans?) or lower (stresses during flowering and seed fill), you may want to adjust accordingly.

   2.5 × Line 3 = ____________

5. Calculate **pounds per acre** by dividing seeds per acre by an estimate of 2,900 seeds per pound. Seed size will vary due to management (e.g., planting dates, seeding rates), variety, growing season (e.g., moderate temperatures and moistures during seed fill), and other stresses. Soybeans that endured heat stress and water stress during seed fill could be smaller due to a shorter seed fill period, and thus, a larger number could be used. SDS-infected soybeans could also have smaller soybeans.

   Line 4 ÷ 2,900 = ____________

6. Estimate **yield** by dividing pounds per acre by 60 pounds per bushel.

   YIELD → Line 5 ÷ 60 = ____________