Estimating the Potential Yield of a Soybean Crop

Potential yield estimates for a soybean crop can be made about the R5 growth stage, but estimates made at the R6 growth stage or later provide better estimates. Yield potential is essentially an estimate of four components: number of plants/acre, number of pods/plant, number of seeds/pod, and number of seeds/pound.

Potential Yield Estimation

Regardless of crop, estimating yield potential can provide valuable information that can be used to formulate decisions regarding storage, drying costs, and marketing. In addition, while gathering potential yield information, weed, insect, disease, and animal pressure can be evaluated. Water, hail, and other environmental issues can also be noted for future reference. As an example, loss of population due to ponding could help influence a drainage decision.

Steps to Estimate Potential Yield

Four essential factors (plants/acre, pods/plant, seeds/pod, and seeds/pound (lb)) are used to calculate estimated potential yield. Determining plants/acre can be accomplished by a couple of methods, the 1000th acre and the hoop. These methods, particularly the hoop method, can be used in the spring when plants are smaller to determine plants/acre and a record kept for use in the fall to help estimate potential yield. Regardless of method, several counts should be obtained to determine a final plant/acre average. The 1/1000th acre method determines plants/acre by counting the number of plants in 1/1000th of an acre (Table 1) and multiplying that number by 1000. The hoop method, best utilized with drilled soybean fields involves determining the diameter of a hoop, tossing it randomly in the field, and counting the number of plants inside the hoop (Figure 1) - difficult if done on nearly mature plants. Multiply the number of plants within the hoop by the appropriate factor in Table 2 to determine

Figure 1. Example of using a hoop to count emerged plants. Several random counts should be taken and the average recorded for use in the fall to help estimate potential yield.

Table 1. 1/1000th Acre Method. Stand count evaluation for 1/1000th acre based on row width and number of plants in a given row length.[2]

Row Width (inches)	Row Length for 1/1000th Acre (feet, inches)
7.5	69' 8"
15	34' 10"
20	26' 2"
22	23' 9"
30	17' 5"
36	14' 6"

Table 2. Hoop Method. Plant count evaluation factors, by inside hoop diameter, for determining soybean plant populations.[3]

Inside Hoop Diameter (inches)	Factor
21.00	18,119
24.00	13,872
27.00	10,961
28.25	10,000
30.00	8,878

the number of plants/acre. If making a hoop, an appropriate diameter is 28.25 inches which allows for multiplying by 10,000. The hoop can be made by cutting a tube such as anhydrous tubing to a length of 88.75 inches and adjoining the ends.

The average number of pods/plant can be obtained by counting the number of pods with at least one seed on 10 consecutive plants (don't skip small plants).[1] Divide by 10 to get the average pod count for that location.
Example:
At one location, a total of 240 pods were counted on 10 consecutive plants for an average of 24 pods/plant.

The average seeds/pod can be calculated by selecting 10 random pods and counting the seeds in each. Dividing the total number of seeds by 10 provides the average/pod for that location. Healthy plants can average about 2.5 seeds/pod while those under stress may decrease to 2.0, 1.5, or fewer/pod.
Example:
5 pods with 4 and 5 pods with 3 seeds, respectively, would be 20 + 15 ÷ 10 or 3.5 seeds/pod.

The seeds/lb calculation can be challenging. Some research indicates a value of 2,500 seeds/lb is a good average; however, some locations report an average of 3,400 seeds/lb should be used.[1] Stressed soybean plants may have smaller seed; therefore, a higher seeds/lb number should be used when calculating yield potential. The seed size indicated on a seed bag may provide a reasonable indication of the seed size to use for the calculation. When the seed tag is not available, 2,500 seeds/lb should be used.

To estimate the average potential yield (bu/acre), the following formula, which uses a standard factor of 1 bu of soybean seed weighing 60 lb/bu, can be used: ((plants/acre x pods/plant x seeds/pod) ÷ seeds/lb)) ÷ lb/bu = average bu/acre.

Example:
((134,000 plants/acre x 24 pods/plant x 2.8 seeds/lb) ÷ 2,500 seeds/lb) ÷ 60 lb/bu = 60 bu/acre average.

Adding the average yields from each field location and dividing by the number of locations provides the overall estimated average yield/acre for the entire field.

Sources:
[1]Lee, C. and Herbek, J. 2005. Estimating soybean yield. AGR-188. University of Kentucky. http://www2.ca.uky.edu/
[2]2013. Corn Field Guide, 2nd edition. Iowa State University.
[3]2014. Corn & Soybean Field Guide. ID-179. Purdue University Extension.
Additional Sources:
Casteel, S. 2012. Estimating soybean yields—simplified. Purdue University. https://www.agry.purdue.edu/
Ciampitti, I. 2014. Estimating soybean yield potential: There is a web-based app for this also! K-State Agronomy eUpdates. Kansas State University. https://webapp.agron.ksu.edu.
Lindsey, L. 2013. Estimating soybean yield. C.O.R.N. Newsletter 2013-28. The Ohio State University. https://agcrops.osu.edu/newsletter/corn-newsletter
Flanary, W. 2012. Estimating soybean yields prior to harvest. University of Missouri Extension. http://extension.missouri.edu/
Pedersen, P. 2014. Soybean growth and development. PM 1945. Iowa State University.
Web sources verified 08/08/18. 130906033002