

News Article

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Understanding agriculture – growing soybeans

If you are one who is perplexed by simple questions about agriculture that you don't understand, read on. Today's article is a primer on growing soybeans, written especially for non-farmers who may have always wondered about this crop.

In Whitley County, as in most of northern Indiana, the predominant crops we grow include corn, soybeans, and wheat and hay. We'll cover soybeans today. According to the most recent statistics available, Whitley County harvested 65,300 acres of soybeans in 2017, with an average yield of 51.7 bushels per acre. In 2016, Whitley County ranked 44th among Indiana counties in soybean production, harvesting 63,200 acres of soybeans at an average yield of 58 bu./acre.

As I explained in a previous article, a bushel is the dry volume equivalent of 8 gallons. For an acre, if you imagine a football field from end zone to end zone, that is approximately 1.1 acres, just a little over an acre.

Soybeans are used for many things, including livestock feed, biodiesel, cooking oil, baby food, crayons, candles, printing ink, margarine, tofu and many other uses.

Farmers test their soil periodically to check for the pH (acidity or alkalinity), and for levels of major and minor nutrients. If the pH is too low (acid soil), farmers must add lime to raise the pH to enable nutrients to be more available to the plant.

Farmers have to add nutrients to soybean crop fields in the form of fertilizer if nutrient levels are not sufficient (as determined by a soil test). However, as a legume, soybeans supply their own nitrogen through little structures that grow on the roots, called nodules. *Bradyrhizobia japonicum* bacteria in the soil infect roots and develop a symbiotic relationship with the soybean plant by "fixing" atmospheric nitrogen, and supplying that nitrogen to the plant. Soybeans can appear yellow (nitrogen deficient) until this nitrogen fixation kicks in. Corn does not have this ability, which is why farmers have to add a lot of nitrogen to corn. Other common legumes include peas, alfalfa, clover and green beans.

If you have a vegetable garden, soybeans look a lot like green beans. They typically get from waist- to chest-high in a farmer's field. As soybeans mature in the field, passers-by will notice the green-to-yellow-to-brown color progression. Eventually soybeans end up as mainly stems with bean pods after leaves have fallen off.

Many inputs are required for a successful soybean crop. Examples include seed, fertilizer, herbicides, and other crop inputs. Different production systems (conventional, organic, no-till, etc.) will vary crop inputs used and how much they cost.

Crop rotation was discussed in my recent article on corn, and the practice is important for soybeans for the same reasons of fighting diseases and insects with a proven non-chemical cultural practice.

Purdue Extension experts construct annual average crop budgets for corn, soybeans and wheat. This information is available at Purdue Center for Commercial Agriculture: <https://ag.purdue.edu/commercialag>. Search for "Purdue Crop Cost & Return Guide."

Just to give you a feel for what farmers face in terms of costs per acre, let's explore some of the costs outlined in Purdue's guide (updated March 2018). For average productivity soil for soybeans in crop rotation, farmers could spend, on average for one acre: \$47 for fertilizer, \$67 for seed, \$65 for pesticides, \$11 for machinery fuel, \$18 for machinery repairs, \$5 for hauling, \$8 for interest on borrowed money, and \$34 for insurance and other miscellaneous expenses, for

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a total of \$255 per acre. If we assume the crop yields 53 bushels per acre, and the selling price is \$9.90 per bushel, the total revenue for that acre is \$525. This leaves \$270 per acre for things like cash rent, labor and profit. In the most recent Purdue land values survey, average cash rent for average productivity soil in northeast Indiana was \$187 per acre. That leaves \$83 per acre. Of course, all of these are averages, but it helps a person understand some economics involved. Weather extremes, production systems, price variability, and other factors and risks all come into play.

At harvest, farmers combine soybeans and store the grain in a bin, or sell to the elevator or biodiesel plant. Some years, farmers may also have to dry soybeans or pay a discount at the elevator to dry it. This must be done so that soybeans can be stored safely without risk of spoilage.

We have just scratched the surface on what it means to grow soybeans. And, granted, there are a variety of management systems that farmers employ. Find Purdue Extension publications on a wide array of subjects at the Education Store: <https://mdc.itap.purdue.edu>.