



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

Hardin County Extension News Release

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What's Holding Soybean Yields Back?

Hardin County – The past three years (2013-15), five farms in Hardin County cooperated with the OSU Extension Soybean Yield-Limiting Factor Research designed by Dr. Laura Lindsey, Soybean and Small Grains Specialist from The Ohio State University. The goal of this research was to determine the limiting factors that are keeping Ohio soybean crops from yielding to their maximum potential. In Ohio, this research was conducted statewide and was sponsored by the Ohio Soybean Council. The project was done in cooperation with the National Soybean Sustainable Initiative in the Midwest.

Global positioning satellite (GPS) information was recorded for each sampling area. Soil sampling for nutrients and soybean cyst nematodes, leaf sampling for nutrients, scouting for weeds, diseases, and insect pests, as well as grain sampling for yield were done each year in three selected areas of the five fields in Hardin County. These three areas represented a typical low yield area and two normal yield areas of the fields. Statewide, there were 149 fields, each with three sampling areas for a total of 447 data points of collection.

Most farmers are aware that the number one yield limiting factor in Ohio soybean production has traditionally been the weather. This factor is out of the control of the soybean producer. However, soil fertility ended up being the second most limiting factor for high yields. Statewide, 24% of the sampling areas turned out to be below the critical level for phosphorus. In the district that includes Hardin County, 26% of the sampling areas were below the critical level for phosphorus, which is established by the Tri-state Fertilizer Recommendations of 15 parts per million (ppm) using the Bray P test. Another primary nutrient, potassium was below the critical level in 13% of the areas sampled statewide. In the

district that includes Hardin County, 8% of the sampling areas were below the critical level for potassium.

The third most limiting factor for soybean production in Ohio turned out to be planting date. Fields planted before May 16 yielded an average of 58 bushels per acre. Fields that were planted after this date yielded an average of 53 bushel per acre during the three years of this study. The fourth most limiting factor for Ohio soybean production was the soybean cyst nematode (SCN). Soybean cyst nematodes are small plant-parasitic roundworms that attack the roots of soybeans. Although many farmers may not know that this pest is in their fields, more than 80% of fields in Ohio have detectable levels of SCN.

So how yield limiting are these top factors? In this Ohio study, there was a 7 bushel per acre yield decrease when soil phosphorus is less than the critical level. There was also a 7 bushel per acre yield decrease when soil potassium is less than the critical level for the field. On the other hand, there was a 5 bushel per acre increase when planting before May 16, compared to planting May 16 or later. There was a 3 bushel per acre yield decrease when SCN egg counts are greater than 200 eggs/100 cc of soil.

As a result of this study, OSU Extension recommends that when possible, follow best management practices for cultural practices such as planting date. Soybean producers should soil test every 2-3 years for soil fertility using either grid sampling or other sampling areas. Every third soybean crop should also be sampled for SCN population, in other words, every 6 years in a corn-soybean rotation. Current seed technologies are advancing for conventional/non-GMO seeds, as well as seeds that express traits for Roundup Ready 1 (Glyphosate tolerant), Roundup Ready 2 (Yield), and Liberty Link systems.

New seed technologies that are around the corner include 2,4-D resistant (Enlist), and Dicamba-resistant (Roundup Ready 2 Xtend). Other factors that soybean producers need to keep their eye on include how to increase yield from a variety of sources, disease considerations, SCN considerations, herbicide programs that make adjustments for resistant weeds, premium niche markets, and relative maturity for seed. Farmers will need to make sure they are relying on research based information to help make the best decisions for improving their soybean crop.