



**THE OHIO STATE UNIVERSITY**

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

### **Hardin County Extension News Release**

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## **Too Much Water or Not Enough N?**

*By Mark Badertscher, OSU Extension-Hardin County*

*Hardin County* – This past year, two Corn Response to Nitrogen plots were studied in Hardin County through OSU Extension. One plot was near Alger and the other was near Dola. These nitrogen plots were in addition to 11 other sites around the state studying the same question centering around ‘how much nitrogen is required to produce a corn crop?’ These On-Farm Corn N rate Trials were part of a larger effort to revise agronomic fertilizer recommendations for Ohio, as well as a larger effort of updating the Tri-State Fertilizer Recommendations.

2015 was the first year for corn nitrogen, phosphorus, and potassium, while 2014 was the first year for soybean phosphorus and potassium research as part of this effort that will take place for multiple years. The majority of this research in Ohio is on-farm involving farmers, Extension Educators, and crop consultants cooperating with Dr. Steve Culman, Assistant Professor and State Specialist in Soil Fertility with The Ohio State University. Funding has been made available from the Ohio Corn and Small Grain Marketing Programs and Ohio Soybean Council.

In a normal year, nitrogen is added to a corn crop with fertilizer and mineralization of residue and soil organic matter. Nitrogen is then removed from crop uptake, leaching into the soil, and denitrification into the air. For the Hardin County test plots, strips of nitrogen were applied at rates of 0, 50 (one plot), 100, 150, 200, and 250 lbs per acre. These rates were repeated randomly for a total of three times in each plot. The plot which had the 50 lb N application rate also had 28 lb of starter nitrogen across the field. The other plot had 0 lb of starter nitrogen, but had over 24% organic matter across the field.

Data collected in each field included management information, a soil test including a pre-sidedress nitrate test, a R1 corn leaf nitrate tissue test, both V8 and V12 crop N remote sensor tests, a late season stalk nitrate test, and a grain moisture and yield test. An excessive amount of rain fell in June with over 6 ½ inches more than the 10 year average for Hardin County. This high amount of rain slowed root

development and nitrogen uptake during a time when the corn crop normally starts to use the most amount of nitrogen. Constant rains continued through mid-July before drying off for an extended period of time.

The plot near Alger reached its top yield of 167 bushels per acre (bu/acre) at the 150 lb N rate. Other yields were 102 bu/acre at 0 lb N rate, 136 bu/acre at 100 lb N rate, 129 bu/acre at 200 lb N rate, and 132 bu/acre at 250 lb N rate. This plot has parallel drainage and was under water for 6 days straight in June. The pH of the soil was 5.3 with 24.2 % organic matter. Phosphorus levels were in the maintenance range while potassium levels were high.

The plot near Dola reached its highest yield of 152 bushels per acre (bu/acre) at the 250 lb N rate. Other yields were 39 bu/acre at 0 lb N rate, 72 bu/acre at 50 lb N rate, 95 bu/acre at 100 lb N rate, 115 bu/acre at 150 lb N rate, and 133 bu/acre at 200 lb N rate. This plot has perpendicular tile drainage and was not under water in June. The pH of the soil was 5.9 with 1.8% organic matter. Phosphorus and potassium levels were in the maintenance range.

In conclusion, higher rates of nitrogen were needed in 2015 to reach maximum yields compared to most years. This indicates a large degree of nitrogen loss and/or that excessive rainfall negatively impacted root development. It is uncertain which factor was the biggest driver of yield loss. Most nitrogen rates at the majority of sites around the state yielded below optimal levels for corn stalk nitrate and R1 ear leaf tissue nitrate levels. Although OSU recommends nitrogen rates based on economic models (maximum economic return to nitrogen), this article only considered agronomics.

In 2016, OSU soil fertility work will continue directly with growers and Extension Educators, but also with crop consultants, ag coops, and agronomists to help facilitate on-farm strip trials. This research will also include nitrogen, phosphorus, potassium, and sulfur trials in corn, soybean and wheat. OSU Extension appreciates the cooperation of the farmers involved in these studies, including those in Hardin County. For further information about this study or in conducting a field trial of your own, contact Mark Badertscher, Agriculture and Natural Resources Extension Educator at 419-674-2297.