

## 2006 Nitrogen Rate Trials

Building New Corn Nitrogen Fertilizer Recommendations for Indiana

Results of 2006 Nitrogen Rate Trials

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Indiana corn nitrogen rate recommendations have been yield-goal based since at least 1968. In the last few years, however, university soil fertility specialists around the Midwest have been moving toward a recommendation strategy that more closely relates corn yield response to nitrogen with the relative economics of nitrogen fertilizer and corn grain.

One of the reasons for reconsidering yield-goal based recommendations is that they are not easily adjusted for changes in grain and nitrogen fertilizer prices. This has not been a serious issue for most of the last 40 years because nitrogen cost has been relatively inexpensive compared to grain value. In 1968 a bushel of corn sold for \$1.05 and anhydrous-nitrogen only cost 5¢ per pound. In recent years, the increased cost of natural gas (the primary input cost for manufacturing fertilizer nitrogen) has resulted in relatively expensive nitrogen. This was especially evident in the last few years when nitrogen prices increased from 20¢ per pound or less to 35-45¢ per pound and grain prices hovered around \$2.00 per bushel. Even today with \$4.00 per bushel corn, a bushel of corn only buys 10 pounds of nitrogen whereas in 1968 a bushel bought twice as much nitrogen.



*Figure 1. Approximate location and some soil series names for corn nitrogen rate trials conducted in 2006. The number inside the circle indicates the number of trials in that region.*

To begin building a database for new nitrogen rate recommendations, Purdue researchers with help from Pioneer Hi-Bred International and Beck's Hybrids, industry agronomists, farmers, A&L Great Lakes Laboratories, the Purdue Agricultural Centers and the Agronomy Center for Research and Education collected data from 32 nitrogen rate trials from throughout Indiana in 2006 (see Fig. 1 for approximate locations of trials). The previous crop for most of the tests was soybean. Most of the trials used 28% UAN liquid nitrogen as the fertilizer source and the primary timing of application was sidedressing. Similar results would be expected from late pre-plant and sidedress anhydrous but not early pre-plant or fall anhydrous. Nitrogen rate treatments were not identical for all trials - most had a starter application as the lowest rate and then increments of 40 to 50 pounds of nitrogen per acre up to slightly more than 200 pounds of nitrogen per acre.

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The nitrogen rate needed for optimum economic yield at \$3.50 per bushel and 30¢ per pound of nitrogen is shown in Figure 2 for 22 corn after soybean trials. Between 150 and 200 pounds of nitrogen per acre was needed for optimum economic yield in most of the trials. The optimum economic nitrogen rate for corn after beans was on average 177 pounds of nitrogen per acre at \$3.50 per bushel corn and 30¢ per pound nitrogen. Last year's prices of \$2.00/bu corn and \$0.40/lb N resulted in an optimum economic nitrogen rate of only 148 lb N/acre. Using 10-15 lb N/acre more or less than optimum reduced profit an average about \$1.00/acre. The average yield of the 22 trials was 185 bushels per acre.

In order to become more confident with this new nitrogen rate recommendation approach we will continue building the response database with more nitrogen trials during the next few growing seasons. In 2007 we will have another 14 trials on our Purdue Agricultural farms; about half corn after corn and half corn after soybeans. We hope that a number of growers will conduct their own on-farm research and submit the results to be included in the database as well. Contact Jim Camberato at [jcambera@purdue.edu](mailto:jcambera@purdue.edu) or (765) 496-9338 if you would like advice in setting up a trial.

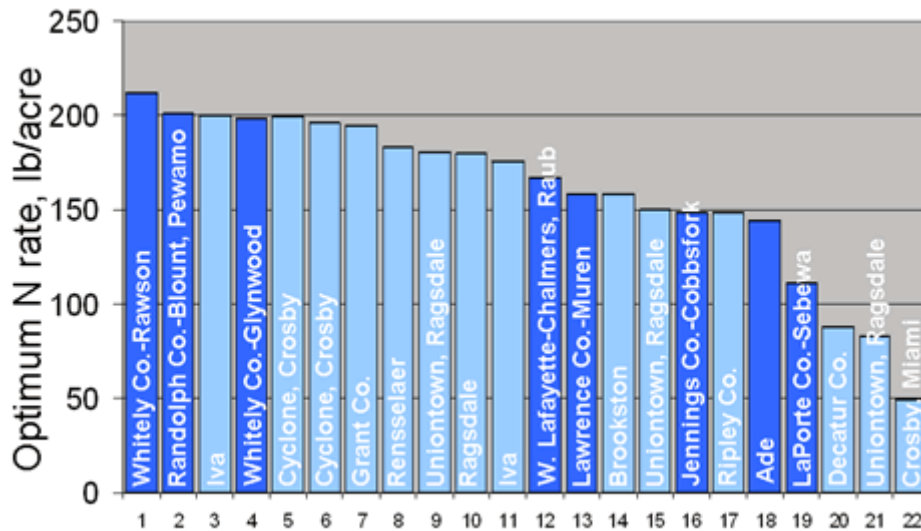


Figure 2. Optimum nitrogen rate for 22 corn after soybean trials conducted in 2006. Grain price was set at \$3.50 per bushel and nitrogen at 30¢ per pound. Tests conducted on Purdue research centers are in dark blue. Text on each bar indicates the soil type or county if soil type was not reported.