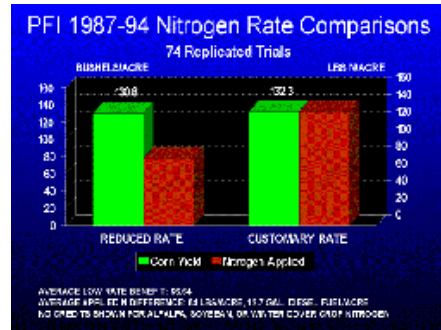


Nitrogen Management Resources

Practical Farmers of Iowa research cooperators have worked with Iowa State University scientists over the past decade as they have developed several new nitrogen monitoring tools for corn. The latest nitrogen bulletins from [ISU can be found on the Web.](#)

The table to the right summarizes results of nitrogen rate trials carried out by PFI members, mostly under a SARE ridge-till project. The average nitrogen rate difference between the high and low-rate treatments was 54 lbs N per acre, the energy equivalent of 12.7 gallons of diesel fuel per acre. The average profit was \$6.64 per acre greater in the low-rate treatments.



Despite the rarity of statistically significant yield differences, there was a consistent, small yield loss at the low rates, averaging 1.5 bushels of grain per acre. Assuming that this trend was real but beyond the sensitivity of the design used, one must subtract from the \$6.64 advantage the value of this grain. However, in some of the trials where the late spring test was used, it was actually the higher of the two N rates that was based on the test. In only two instances did following the recommendation of the test lead to a significant yield loss.

PFI farmers often undercut the recommendations of the test with their low N rate. The farmers' opinion seemed to be that having livestock manure and green manure in their system increased the potential for soil mineralization of nitrogen that would not be registered by the soil test. Subsequent research at Iowa State University has confirmed that belief. Distinct critical levels have recently been set for manured soils and for corn following alfalfa by one or two years.

The basic relationship, however, is illustrated in the graphic below. There is a "critical level" beyond which no additional nitrogen is required by the corn crop. Before adjustments, the critical level is around 25 parts per million nitrate (ppm) nitrogen. The critical level can be adjusted by rotational history, manure history, and the price ratio of nitrogen to corn. Whatever critical level you decide on, if your late spring soil nitrate test comes up short of that, then the crop will probably respond to some additional N. Just how much is indicated by the sloping line in the graphic, which is sometimes approximated by a "stair step" recommendation. It amounts to 8 pounds of additional N for each ppm that your test is short of the critical level. If, for example, you are working with a critical level of 25 ppm nitrate-N and the test comes back 20 ppm, then the crop would respond optimally to an additional $(25 \text{ ppm} - 20 \text{ ppm}) \times 8 \text{ lbs N} = 5 \times 8 = 40 \text{ lbs nitrogen}$.

