

University of Minnesota Extension Fact Sheet

Nitrogen Availability from Liquid Swine and Dairy Manure: Can we trust small plot studies?

Audiences often express concerns that small plot experiments do not represent what occurs in farm fields. In other research, it was shown that combine yields from large areas are lower than small plot yields, but that treatment effects on yield are similar (UM Extension Bulletin MI-07936). Those researchers found that plot size did not affect fertilizer N rate recommendation.

We took the opportunity to compare large and small plot corn yield in an experiment on 13 Minnesota farms over two years to estimate the N availability from liquid dairy and swine manure (UM Extension Bulletin 08583). We compared the three treatments (no manure, one-half rate, and full rate) that were the same for the field strips (12 to 16 rows wide by 500 to 2480 feet long) and the small plots (four rows wide by 30 feet long). We measured corn grain yield in small plots by hand harvesting the middle 20 feet of the center two rows, and in large strips by combining with yield monitors on the farmer's equipment. All yields were adjusted to 15.5% moisture.

Results:

Nonmanured strips produced the lowest combine yields at each location (107 to 177 bu/acre). Highest average combine yields in the manured plots at each location ranged from 133 to 223 bu/acre. Average yields from the hand-harvested small plots were similar to those from the combine-harvested field strips, but were about 9% higher (Figure 1). A portion of this difference likely was due to losses during combining. In addition, the field strips included a wider range of soil conditions than the small plots. Only one location showed no relationship between the average field strip and average small plot yields, and it had received 80% more rainfall during the growing season than normal, which adversely affected the small plot area more than the strips (Watowan County).

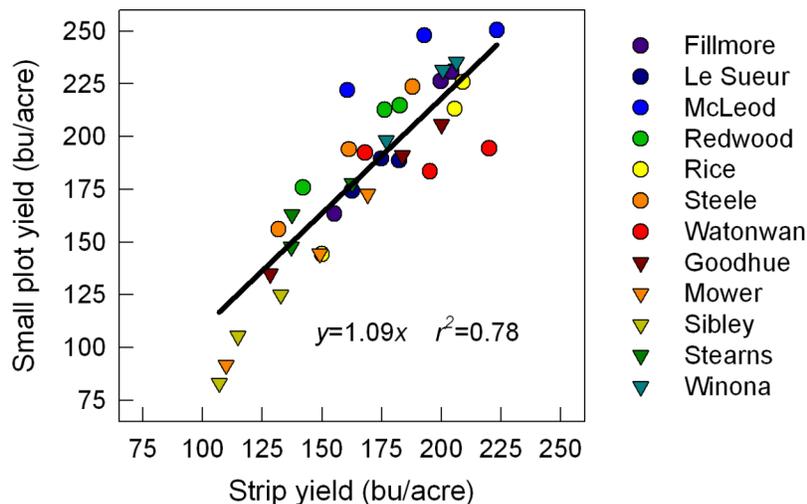


Figure 4. Comparison of corn grain yield from combine-harvested field strips and hand-harvested small plots. Sites with swine manure are shown with circles; those with dairy manure are shown with triangles. One site was not included (Blue Earth County), because strips were inadvertently harvested with the surrounding field area.

Conclusion:

When small plot studies are placed in representative areas of the field, **comparisons of treatments on small plots reflect the differences that occur in larger areas.**