

University of Minnesota Extension Fact Sheet

Nitrogen Availability from Liquid Swine and Dairy Manure:  
Ear leaf chlorophyll measurements

Leaf chlorophyll concentration is closely related to N supply and can be estimated by leaf ‘greenness.’ Such measurements are especially useful for crops that can be fertilized during growth. Because livestock manure supplies N both rapidly (from ammonium N) and more slowly (mineralized organic N), we

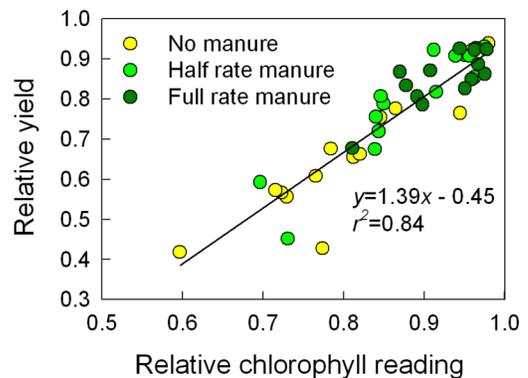


measured leaf chlorophyll to determine whether it would predict both grain yield and the fertilizer N equivalence (FNE) of liquid manure. This research was part of an on-farm experiment on manure N availability to corn (UM Extension Bulletin 08583).

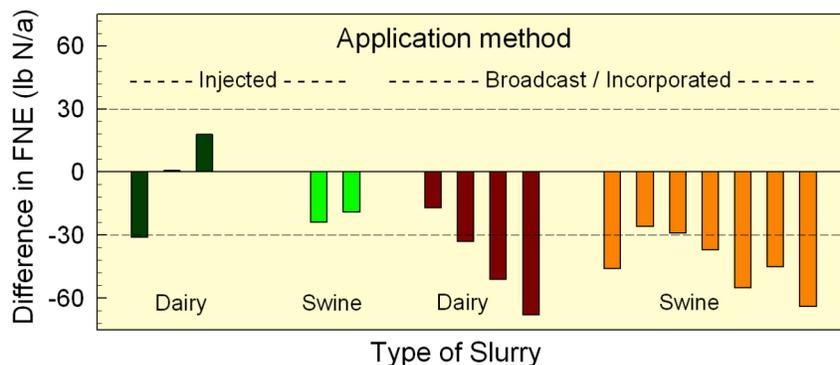
Ear leaf chlorophyll measurements with a SPAD 502 Chlorophyll Meter at silk emergence were averaged from 30 plants in each plot. Relative chlorophyll concentration for each plot was calculated in comparison to the plot with the highest chlorophyll reading at the same site (that is, from the plot in which plants had the least N limitation).

Results:

As has been seen in other research, we found that relative chlorophyll reading at silking predicted relative corn grain yield fairly well – the higher the chlorophyll reading in a treatment, the higher the eventual grain yield. Thus, a farmer who has a strip of highly fertilized corn (not N limited) in a manured field could evaluate whether the area without commercial N was deficient. However, this relationship by itself does not indicate how much N is missing. For that, we need to estimate the FNE.



The FNE of manure based on these mid-season chlorophyll measurements averaged about two-thirds as high as FNE based on grain yield. The higher values at the end of the season probably reflect continued mineralization of N from the manure during corn growth. However, the relationship between the two FNE estimates at each site was poor. **Estimates based on ear leaf chlorophyll ranged from 68 lb N/acre lower to 18 lb N/acre higher than those based on grain yield, and were more similar for injected manure than for broadcast/incorporated manure.** Bars below the zero line indicate that the FNE based on chlorophyll was lower than the FNE at the end of the season. In only one case was the difference larger for the chlorophyll than the yield-based FNE estimate.



Conclusion:

Although ear leaf chlorophyll can indicate whether corn has sufficient N, it does not appear to produce reliable estimates of season-long manure N availability. **Therefore, we do not recommend use of chlorophyll meters for forecasting the need for additional fertilizer N when corn is utilizing N from recent manure applications.**