N mineralized, in 1 week. Theoretically, significant amounts of N are mineralized before plant accumulation rates exceed N mineralization rate so a correlation between N and crop yield, etc. is expected.

The assumption by Griffin and Laine (1983) that a linear relationship exists between k and the fraction of available soil water seems unwarranted. Stanford and Epstein (1974) observed a near linear relationship between relative N and percent optimum available water content (0\text{opt}), not between k and 0\text{opt}. Because k and N are by definition exponentially related, it follows that k and 0\text{opt} are exponentially related.

Data from Stanford and Smith (1972) and Stanford and Epstein (1974) contain evidence that 0\text{opt} for mineralization is related (in a complex manner) to organic C content, N content, C:N ratio and mineral surface area (% clay or CEC). If these parameters affect 0\text{opt}, then assumption of a 0\text{opt} based only on Stanford and Epstein's results could be erroneous for soils amended with large amounts of organic wastes.

Examination of the N, temperature and moisture data incorporating the indicated corrections should result in an improved test of the N concept. Griffin and Laine's treatment is not rigorous enough to conclude that N is not a soil characteristic. Because the authors have not provided enough data for interested readers to incorporate essential corrections, I encourage them to examine their data further before concluding that N or its derivative does not correlate with N accumulation or crop yield.

RE: Reply to Nitrogen Mineralization Potentials, N, and Correlations with Maize Response

In estimating N, Griffin and Laine (1983) used the equation:

\[ N = N_0 (1 - e^{-k}) \]  \[1\]

with k, the mineralization rate constant, adjusted for both soil temperature and soil moisture. A more appropriate equation would have been:

\[ N = N_0 (1 - e^{-k} \times W) \]  \[2\]

where k is adjusted only for soil temperature and W is the fraction of available soil water or some other fraction of optimum soil water content for mineralization. As Olness (1983) states, Stanford and Epstein (1974) did not observe a near-linear relationship between k and optimum water content, as Griffin and Laine (1983) suggested. We appreciate this fact being brought to the attention of readers.

For the N and k values obtained in our study, the differences in N values obtained from Eq. [1] and [2] are negligible. For example, if N = 300 mg N/kg soil and temperature-adjusted k = 0.020 week\(^{-1}\)

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<tr>
<td>1.00</td>
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<td>0.50</td>
<td>2.99</td>
<td>2.97</td>
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<td>0.30</td>
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Using Eq. [2], we recalculated estimated N released for the seven soils in our field study. The results are nearly identical to our original estimates based on Eq. [1] (Table 1). When the factor for soil moisture (W) is the fraction of soil moisture content at 20 kPa, higher N values were obtained (Table 1).

Simple coefficients of correlation between corn yield, N uptake and estimates of N released were virtually the same when N was based on Eq. [1] and [2] (Table 2). In some cases, slightly higher correlation coefficients were obtained when estimates of N released were calculated with W expressed as the fraction of soil moisture content at 20 kPa.

We also estimated N released during the period of 30 to 90 days after corn emergence. In doing this, we used Eq. [2] and assumed, as Olness (1983) suggests, that N does not change much until early June and that maximum N accumulation rates occur during the 30- to 90-day post emergence period. Therefore, we used original N values starting with the 5th week after emergence and calculated cumulative N values for a period of 60 days (up to 90 days after emergence) (Table 1). These estimates, expressed as kg N ha\(^{-1}\) per Ap horizon, do not correlate with yield or N uptake, while some of the estimates based on the April to harvest period do correlate with these parameters (Table 2).

Determination of the optimum soil water content for mineralization on these soils was beyond the scope of the original study. As Olness (1983) suggests, we might have obtained more accurate estimates of N and better correlations with such information. As we noted in the article, some...