Nutrient Management

Conversion Equations Part 2: Do Mehlich-III K, Ca and Mg Have Morgan Equivalents?

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Introduction

In the March-April issue of "What's Cropping Up?" (Vol 11, No 3) we reported our findings on the use of Mehlich-III soil test phosphorus (P) to derive Cornell University based fertilizer recommendations. We concluded that, while the most accurate recommendations are derived using the Morgan soil extraction solution, acceptable recommendations for New York can be derived with modified Morgan as well as Mehlich-III P input data from the participating commercial laboratories if the soil pH, Mehlich-III calcium (Ca) and Mehlich-III aluminum (Al) are known. In this article, we focus on conversions for potassium (K), Ca, and magnesium (Mg).

Field Sampling and Analyses

The same soils dataset as those on which the P conversion equations were based was analyzed for exchangeable K, Ca, and Mg. Personnel from Agway Inc., Agricultural Consulting Services Inc., ConsulAgr Inc., Cooks Consulting Services and the Miner Institute collected the 235 plow-depth soil samples representing 27 soil types and eight major agricultural soil groups from across NY (see Table 1 on page 2 of "What's Cropping Up?" Vol 11, no 3). Each sample was analyzed for Morgan extractable K, Ca, and Mg at Cornell's Nutrient Analysis Laboratory and for Mehlich-III extractable K, Mg, Ca at Brookside Laboratories Inc.

Results

The 235 soil samples covered a wide range of soil K, Ca, and Mg levels. Soil K levels ranged from 20 to 549 ppm K (Morgan extraction); soil Ca levels varied from 416 to 7854 ppm Ca and soil Mg covered the range from 60 to 538 ppm Mg.

Morgan extractable K, Ca, and Mg were linearly related to Mehlich-III extractable K, Ca and Mg, respectively, according to the following equations:

Morgan K (ppm) =
1.1 * Mehlich-III K (ppm) - 24 **(r^2=0.94)**

Morgan Ca (ppm) =
1.2 * Mehlich-III Ca (ppm) - 411 **(r^2=0.93)**

Morgan Mg (ppm) =
1.0 * Mehlich-III Mg (ppm) - 9 **(r^2=0.94)**

In these equations *all data are in ppm.* To convert ppm to lbs/acre, multiply by 2. Figures 1 through 3 show the regression analyses for each of the soil nutrients.

Conclusions

Our results indicate that the Mehlich-III solution extracted on average slightly more K and Mg and slightly less Ca than the Morgan extraction solution but that the relationship between the Mehlich-III and Morgan extracted Ca, K and Mg is essentially a one-

Figure 1: Relationship between Morgan and Mehlich-III extractable K for 235 NY soils.

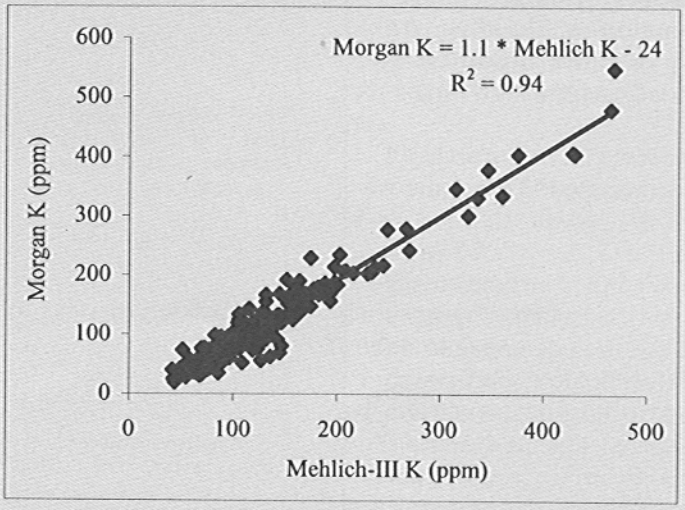
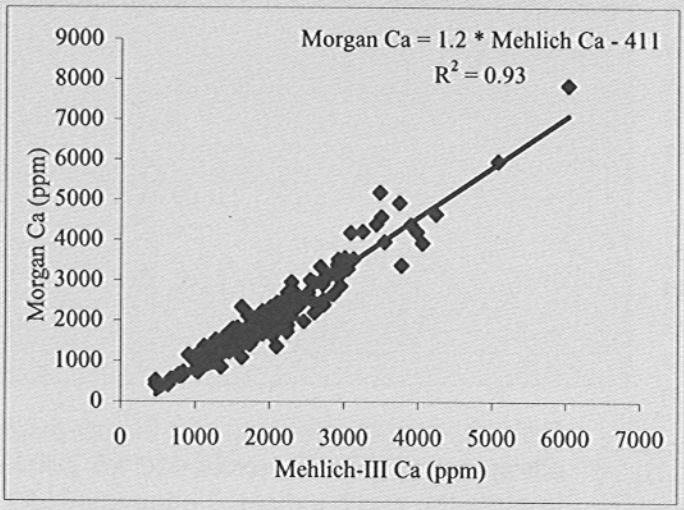


Figure 2: Relationship between Morgan and Mehlich-III extractable Ca for 235 NY soils.



to-one relationship. Thus, Cornell based fertilizer recommendations for K, Ca, and Mg can be derived with Mehlich-III input data. As was the case for P extractions, separate studies are needed to address conversions for other extractants and when laboratory procedures are changed.

Acknowledgments

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Figure 3: Relationship between Morgan and Mehlich-III extractable Mg for 235 NY soils.