The New Wisconsin Soil Test Recommendation Program

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The modern Wisconsin soil testing program was originally developed in the early 1960's. It was revised rather thoroughly in 1970 and again in 1981. New research advances, additional correlation and calibration data, changes in user needs, and shifts in philosophical viewpoint make it necessary to periodically review the soil testing program and the recommendations that emanate from that program. The current revision is an attempt to incorporate additional research, eliminate certain inconsistencies and better serve the needs of Wisconsin farmers.

The new recommendations may be somewhat different with similar soil tests from those that would have been received in the past. However, that does not mean that what we were suggesting previously was wrong; it simply means we now have more information (additional research) and the current economic and environmental situation is different today from what it was in 1970, or even 1980. To a large extent, the previous system generally tried to remove nutrients as a limiting factor in crop production. Soils test were generally low and needed building. No attempt was made to limit rates because of potential environmental consequences, although efficient management was discussed extensively and educational programs stressed this theme. Furthermore, the relatively low cost of nutrients in comparison to other costs of production often resulted in production economics favored erring on the high application side as compared to under application.

The Old Wisconsin System

The Wisconsin system was always known as one which utilized the buildup-maintenance philosophy, but in practice it very much incorporated the concepts of the crop fertilization approach into the recommendation scheme. As is true for other states, Wisconsin totally relied on the crop fertilization philosophy for nitrogen recommendations. This means that N response curves are developed for a specific crop for that soil and environmental conditions. After accumulating many years of response curves, a general N

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recommendation was created that considered the economic optimum. This economic consideration examined several crop:fertilizer price ratios (8:1 to 16:1), but did not consider societal costs for the inefficient use of the N.

The previous Wisconsin system for P and K suggested that soil test levels should be built to some optimal level, and then held there by maintenance fertilizer applications. This optimal level was defined as that zone where there was little chance for additional response for fertilizer. This was defined as the "high" interpretative level. The program also assumed that alfalfa was a part of all crop rotations; therefore, unless otherwise specified, the optimal P and K soil test levels were based on relative responsiveness to alfalfa. In the case of vegetables, the responsive range was set somewhat higher than it was for alfalfa due to the generally high value of these crops, and in a few cases, response data at fairly high soil test levels. In general, we suggested that soil test P be built to 90-150 lb/a and soil test K, 300-400 lb/a. Once soil tests were to be built to this high level (where there was no longer much of a chance for response to nutrient applications), they were to be held there by the application of nutrients to replace what was removed in the harvested part of the crop. Experiments conducted by Peterson, Curwen, Kelling, Liegel, and others have contributed to the critical level establishment. The absolute soil test P and K levels at which this occurs was somewhat adjusted according to the subsoil nutrient supply power.

The New Wisconsin Program

The new Wisconsin soil test recommendation program will remain similar in some ways; the N recommendations will continue to be based on crop response curves, and the P and K soil tests will be built to some optimal level. However, there are some distinct differences between the old program and what will be done in the new one.

1. The nitrogen portion of the corn program will suggest a base N recommendation based upon soil yield potential, growing season, organic matter level and soil texture. Yield goal will no longer be a consideration. For most vegetables, the N rate will be given for a high, but realistic yield goal range.

2. The optimal soil test levels for P and K have been redefined to recognize that the economic optimum nutrient application occurs when nutrient contributions from both the soil and applied materials are considered. This means that we have now defined the "optimum" category as that soil test level where economic response is optimized at a level of nutrients applied about equal to the quantity removed in the harvested portion of the crop. This approximately corresponds to the medium level in the old system.

3. The system will be much more crop sensitive. Rather than having crops assigned to only three demand levels for P and K, now

crops are placed into one of six. The demand level categories are: 1) corn; 2) soybeans and low demand field crops; 3) alfalfa and low demand vegetable crops; 4) red clover/birdsfoot trefoil and medium demand field crops; 5) high demand vegetable crops; and 6) potatoes. The critical demand or optimal level for each category has, to the extent possible, been determined by calibration trials.

4. The system will continue to adjust for subsoil fertility, but will utilize new buffering capacities.

5. Somewhat more risk has been put into the system in favor of short-term economic advantages in that the program will phase to a zero application rate more quickly. This will require that people monitor their soil test levels somewhat more closely. We recommend that tests be taken at least every three years and preferably every other year on sandy and other low buffering capacity soils.

6. The lime program has been individualized for all crops, therefore, soil pH will not be recommended to 6.6 and 6.9 for all rotations. Lime will be recommended only to the level required for the most acid sensitive crop in the rotation.

7. Soil tests for secondary and micronutrients will continue to be interpreted by critical soil test levels. However, now these interpretations will be tempered by the crop being grown. If the soil is low or deficient in a certain micronutrient, response to application of the micronutrient likely will occur and be recommended if the crop has a "high" requirement for the respective micronutrient; response probably will occur and will be recommended at a lower rate if the crop has a "medium" requirement; and response most likely will not occur and will not be recommended if the crop has a "low" requirement. The computer will not automatically print a recommendation for a nutrient if the crop need is low.

8. Sulfur recommendations will be based on a model which includes the soil test for sulfur and estimates of other sources of available sulfur including organic matter, manure, precipitation, and subsoil sulfur.

9. The program will try to account for much more site-specific information, such as manure or legume fertilizer replacement credits, when this information is provided.

10. The report form will provide recommendations for the two crop rotations or sequences that are specifically indicated. Up to three crops can be included in each sequence. Where specific crops are not indicated, the program will default to corn-oats-alfalfa.

11. Results of the soil tests will be reported in percent for organic matter (previously was in T/a) and parts per million (ppm) for P, K, and the other nutrients (previously was lb/a).

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