NEW HORIZONS IN SOIL SCIENCE

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Wisconsin Soil Test Summary: 2005-2009

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Soil test data from over five million samples collected from Wisconsin farmland and analyzed by both public and private Wisconsin certified soil testing laboratories have been summarized every 3 to 5 years since 1964. Summary of soil test data is useful for not only identifying broad fertility trends, but also for evaluating fertilizer, lime and manure management practices, isolating areas of unique, localized fertility conditions requiring special management and for identifying soil areas having high environmental risk to water quality.

Available P and K (Bray-1), pH (water), organic matter (loss of weight on ignition) and secondary/micronutrient results are summarized for approximately 1,080,000 soils tested during 2005-2009. This represents approximately a 58% increase in samples compared to the 2000-04 summary period. Nearly 90% of these were in the medium and fine texture category and approximately 9% were coarse-textured soils. The balance was made up of organic soils and red soils from eastern Wisconsin.

Phosphorus

Average soil test P for all Wisconsin farm soils decreased from 53 ppm in 2000-04 to 51 ppm in this 2005-09 summary period. Applying no more than recommended rates of phosphate fertilizer and/or crediting manure nutrients have become more common practices on Wisconsin farms and is reflected by this change in the long term trend of increasing soil test P levels. For the past five years, 54 of 72 Wisconsin counties had either no increase or a decrease in soil test P after regular upward trends in soil P levels since 1964.

The average soil test P for the coarse textured soils was 80 ppm as compared to the medium/fine-textured soils where the average was 50 ppm. The counties where soils are intensively managed for potato production had the highest soil P levels. Optimum soil test P levels required by potato and processing crops grown on coarse-textured soils can be considerably greater than for most other agronomic crops. There were some large changes in these counties including a 53 ppm decrease in the average for Oneida County and 45 ppm increase in Portage County. Soil test P changes in counties that predominantly contain medium and fine textured soils were relatively minor (5-10 ppm) by comparison.

Potassium

Soil test K for all soils summarized has decreased from 134 ppm in 2000-04 to 126 ppm in this 2005-09 summary period. This is the lowest average level since the 1982-85 summary period where the average was 124 ppm. At the time of the first summary forty-five years ago, average soil test K was 83 ppm. Increases in soil test K were relatively high (averaging 7 ppm per summary period) beginning with the 1964-67 summary period until the 1995-99 summary period. During the last two five year summary periods, the change has been of this same magnitude but in the opposite direction going from 141 ppm to 134 ppm and now to 126 ppm. Most counties have average soil K values on the upper end of the optimum level for corn (71-130 ppm) and alfalfa (71-140 ppm) production or somewhat above the optimum level. At optimum soil test levels, the amount of recommended potash is equivalent to crop removal. The average soil test K for coarse-textured soils of 103 ppm compared to 128 ppm for medium and fine textured soils, which reflects the lower CEC these soils have and the higher potential for rapid change under intensive cropping. Either a decrease or no change in average soil K level was seen in 63 of the 72 counties after regular upward trends until about ten years ago.

pH

Average pH for all soils in 2005-09 was 6.6, which is the same as was seen in the two previous summary periods. Overall, medium and fine textured soils used extensively for corn and alfalfa production have average pH values of 6.7, indicating that forage producers recognize the importance of liming to maintain optimum alfalfa yields. Liming soil to pH 6.8 if cropped in rotation with alfalfa or 6.3 if red clover is recommended. Coarse-textured and organic soils cropped mainly to high value vegetable crops have average pH values of about 6.3. Target pH for most high value vegetable and processing crops is 6.0 or less.

Organic Matter

Average soil organic matter for all soils tested in 2005-09 is 3.3% as compared to 3.2% in the previous summary period. Medium and fine textured soils had average organic matter levels of 3.2% while the corase-textured soils averaged 1.4%.

Top Ten Soils

There was some shuffling among the top ten soils for the 2005-09 summary period but only one new soil on the list. The Manawa series replaced the St. Charles soil in the top ten. All soil groups except O are represented. There are four group C soils, two each in groups A and D and one each from groups E and B. The Kewaunee soil is once again the most commonly tested soil and by a rather wide margin. Approximately 46% of the soils sent for testing are being identified by name, which is about 5% lower than the previous summary period. Having the soil series listed on the information sheet helps assure that the appropriate recommendation is given. If the series is not given, default assumptions need to be made, which may result in recommendations which may not fit the crop/soil situation as well. The differences in soil test P and K levels shown for some of these top ten soils give evidence of their predominant use and characteristics. Plainfield has the highest average soil test P and is cropped extensively to high value vegetable crops. Highest K levels are noted for the Plano series, reflecting intensive management. In all cases, the median soil test P and K values are less than the average soil test value for each texture/type indicating that there are extremely high testing fields biasing average values.

Secondary/Micronutrients

Average results for secondary (Ca, Mg, and SO_4-S) and micronutrients (B, Zn and Mn) have been summarized since the 1995-99 summary period. In addition, data exist from two earlier summaries including 1974-77 and 1982-85. It appears that there has been an increase in soil test Ca and a decrease in available Mn levels over the last 35 years, both of which are most likely related to liming practices. This is verified by the increase in statewide soil pH from 6.3 to 6.6 during that same time frame. The need for application of micronutrients is based on soil test level, soil type/texture and relative crop need. The need for sulfur amendments is based on a model that includes soil test SO_4-S as well as other significant sources of S.

Summary

The changes in soil test P and K show widespread adoption of good fertility management practices necessary for profitable crop production. Where high value crops such as potatoes and other processing crops are grown, high phosphate fertilization rates can bias county averages upward. The central sands are an example of this situation. The median value for all soils tested during 2005-09 was 35 ppm for soil test P and 110 for soil test K. These median values are substantially less than the average values of 51 ppm soil test P and 126 ppm soil test K, giving further evidence that there are some intensively managed areas biasing the average upward. Median soil test P values for the top ten soils show that most are below levels which are typically associated with the greatest amount of environmental concern. However there are certain soils and areas where extremely high soil test P may compromise environmental quality and require special management. The decreasing trend in soil test P and K shown in many counties is encouraging evidence that nutrient management planning is being implemented. Continuing to summarize soil test data can help educators and farm advisors develop strategies necessary for Wisconsin farmers to maximize crop production while recognizing and minimizing environmental problems. However, only good, representative sampling and testing of individual fields can provide growers with the data needed to make informed nutrient application decisions to achieve economically optimum yields while minimizing environmental concerns.