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WISCONSIN SOIL TEST SUMMARY: 2000-2004

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Soil test data from over 4 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 685,000 soils tested during 2000-2004. Over 91% of these were forested sandy loams and silts of the southern, southwestern and west-central regions, imperfectly drained soils of north-central area and prairie soils. Approximately 53,000 coarse-textured soils mainly from the central sands region and lesser numbers of organic and red calcareous soils are also included.

Phosphorus

Average soil test P for all Wisconsin farm soils increased slightly to 53 ppm in 2000-2004 from 52 ppm in 1995-1999. When the first Wisconsin soil test summary was done 40 years ago, average soil test P value for all farm soils was 29 ppm. 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 the slowed rate of overall increase since 1990. In addition, 26 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 northern counties of Langlade and Oneida, where soils are intensively managed for potato production, had the highest soil P levels. Soil test P changes since the last summary were relatively minor (5 to 10 ppm) for the soils in these two counties and in the central sands area which have extensive acreage of coarse-textured, irrigated soils where high value crops such as potato, snap bean, and sweet corn are grown. 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. Soil test P is generally a little lower for the calcareous red clays common in the eastern region of the state and, partially, reflects the reduced efficiency of the Bray-1 extraction on these marl-based soils. Because of this anticipated effect, the interpretation and recommendations for phosphate application on soils having pH >7.5 are adjusted accordingly.

Potassium

Soil test K for all soils summarized has decreased to 134 ppm in 2000-2004 from 141 ppm in 1995-1999. This is the same average level as was found in the 1990-1994 summary period. At the time of the first summary 40 years ago, average soil test K was 83 ppm. Increases in soil test K were relatively high (8 to 18 ppm) prior to 1982-1985, but became modest until the 7 ppm average gain in 1995-1999. Most counties, except those in the northern region where agriculture production is limited, have average soil K values on the upper end of the optimum level for corn (71 to 130 ppm) and alfalfa (71 to 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 110 ppm compared to 136 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. However, both are considered optimum for alfalfa production because of the difference in extraction efficiency between textural types. Reaching these levels indicates that forage producers recognize the importance of adequate K fertility for optimum production of the 3.5 million acres of forage harvested annually.

Either a decrease or no change in average soil K level was shown in 54 counties after regular upward trends since 1964.

pH

Average pH for all soils in 2000-2004 was 6.6, which is the same as was seen in the previous summary period. 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. Thirty years ago, average soil pH was only 6.3. 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 2000-2004 is 3.2% and has shown little change over time. Medium- and fine-textured soils had average organic matter levels of 3.0%, while the coarse-textured soils averaged 1.4%.

Top 10 Soils

There were several changes in the top 10 soils for the 2000-2004 summary period. All subsoil groups except O are represented. Loyal and Onaway are new to the top 10 list and Rosholt and Tama have fallen out. There was a huge increase (2x) in the number of Kewaunee series soil samples, making it the most commonly tested soil. Withee, the #1 soil from the previous summary period dropped to fourth. Undoubtedly, this is related to the fact that a significant amount of the area previously mapped as Withee has been reclassified as Loyal in recent years. Approximately 51% of the soils sent for testing are being identified by name, which is a huge improvement over previous summary periods. 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 10 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) are shown for all soils summarized for 2000-2004. 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 potato 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 2000-2004 was 38 ppm for soil test P and 119 for soil test K. These median values are substantially less than the average values of 53 ppm soil test P and 134 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 10 soils show that most are below levels that 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.