

## A Survey to Evaluate the Current Status of Land Grant University and State Department of Agriculture Soil Fertility Recommendations and Analytical Methods (2020-2022)

Soil testing and fertilizer nutrient management are at the core of modern agriculture. The majority of soil test correlation and calibration trials and development of fertilizer recommendations occurred from the 1950's to 1970's. Despite many changes and advancements in agronomy and increases in crop yield, little soil fertility research has been conducted in the last several decades. Today, the imperative of upgrading soil test fertilizer recommendations is highlighted by global supply chain disruptions and concerns over the fate of fertilizer nutrients in the environment.

The Fertilizer Recommendation Support Tool, or “FRST”, is a national initiative to modernize fertilizer recommendations by pooling expertise and soil test correlation and calibration data from across the country into an accessible decision support tool. Researchers working as a national team rather than within individual states and institutions will reduce ambiguity while optimizing nutrient use across state lines through the development of the FRST. Users will select specific conditions, such as soil, crop, geographic region, and soil test extractant, to provide tailored soil test recommendations that are expected to save farmers millions of dollars annually while reducing excess nutrient losses to the environment.

To address the lack of soil testing coordination among states, a survey of land-grant university

soil fertility faculty was developed and administered to collect current information about the state and practice of the science. The goals of the survey were to gain a better understanding of the current status of soil testing across the U.S., to inform future collaborative efforts among states and regions, and to identify where opportunities exist to harmonize recommendation guidelines. The objectives were to collect information about state soil test recommendations, fertilization philosophy, analytical methods, and the origin of soil test correlation and calibration data that support soil-test-based recommendations.

The survey was adapted from one conducted in the Southern Region (SERA-6) in 2018 and expanded to include information relevant to other regions in the U.S. The survey was developed using Qualtrics Software (Qualtrics, Provo, UT) and distribution was coordinated with the four regional soil test working groups in February 2020. Over 60 responses from 48 states and Puerto Rico were received by the survey close in June 2020.

Survey responses for each state were reviewed for consistency and correctness and organized into topic-specific tables. These tables were re-distributed to survey participants for follow-up review and confirmation of provided information, totaling three years of data collection (2020-2022).

Results were summarized into topic-specific tables including:

- Survey participant information;
- General information about public soil testing laboratories;
- Sources of support and funding for research;
- Soil test phosphorus and potassium correlation and critical level for selected crops;
- Nutrient recommendation philosophies;
- State collaborations to coordinate phosphorus and potassium recommendations;
- Soil acidity measurement methods and lime recommendations;
- Sulfur testing and correlation and calibration research;
- Micronutrient testing and recommendations;
- Sample preparation and analytical methodologies recommended for routine analysis;
- Soil health research and soil test recommendations.

Some overarching results demonstrate a reduction in soil fertility faculty at most land grant universities, a reduction in public soil test laboratories, outdated state-based soil test phosphorus and/or potassium recommendations with unknown origins, increased consensus around soil test extractants, and limited funding for soil fertility research. It is clear that a new emphasis on soil test research with a focus on cooperation across state lines is needed.

**The survey, data tables, and raw data from the survey are available** through the National Ag Library: Spargo, J. T., Lyons, S. E., Clark, J. D., Osmond, D. L., Parvej, R. Md., Pearce, A. W., Slaton, N. A., Saffire, D., Alford, S., Allen, T., Arnall, B., Buob, T., Camberato, J. J., Cardon, G., Culman, S. W., Davenport, J. R., Fernandez, F. G., Florence, R., Flynn, R., Franzen, D., Geisseler, D., Grove, J., Hardy, D., Heckman, J., Hopkins, B., Hoskins, B., Hue, N. V., Huluka, G., Jones, C., Jones, K., Kaiser, D. E., Kalmbach, B., Ketterings, Q. M., Laboski, C. A. M., Lessl, J., Lucas, E., Maguire, R., Mahler, R., Mallerino, A., Margenot, A., McGrath, J. M., Miller, R., Moore, A. D., Morris, T. F., Mylavarapu, R., Nathan, M., Nelson, N. O., Norton, J., Pena-Yewtukhiw, E., Pettinelli, D., Provin, T., Radin, A., Ross, D., Saunders, O., Self, J., Shober, A. L., Sonon, L., Sotomayor, D. R., Stammer, A., Steinke, K., Toor, G., Walworth, J., Wang, J. J., Wortmann, C., Zhang, H. 2022. [A survey to evaluate the current status of land grant university and state department of agriculture soil fertility recommendations and analytical methods.](#)

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For more information visit [soiltestfrst.org](https://soiltestfrst.org).

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