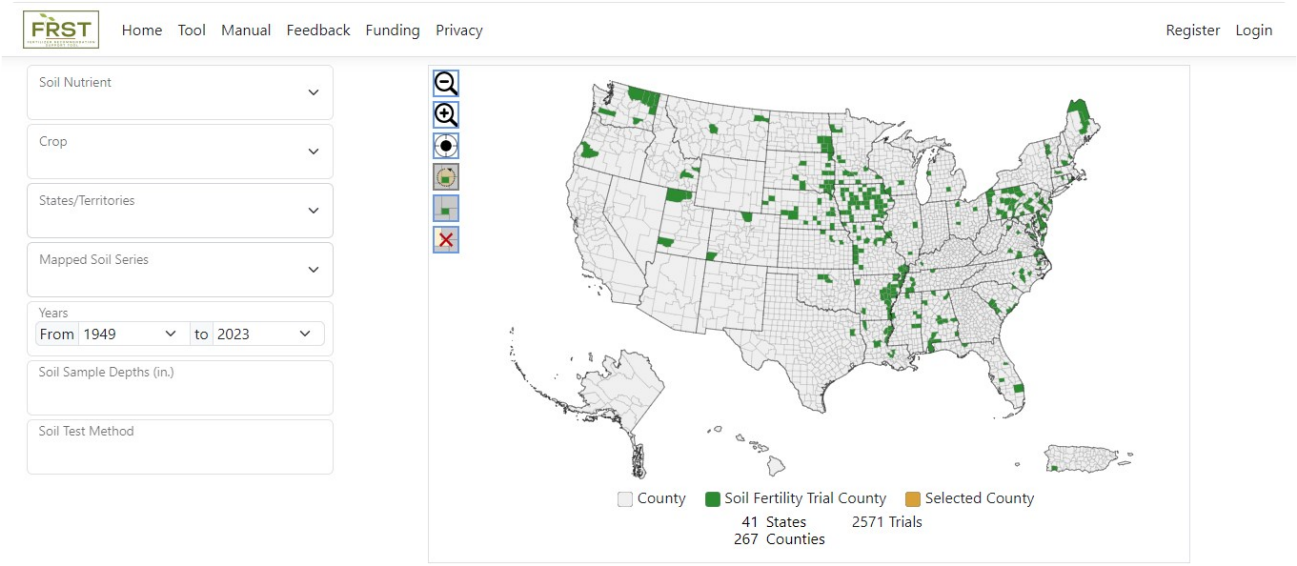
Science Societies

The FRST database and decision support tool goes online

By Tess Joosse

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The Fertilizer Recommendation Support Tool (FRST) decision aid (https://frst.scinet.usda.gov/Tool) consists of an interactive map and soil test correlation and calibration data for phosphorus (P) and potassium (K) trials from 21 crops in 40 states and Puerto Rico.

The Fertilizer Recommendation Support Tool (FRST) is a first-of-its-kind online national database of soil test data and a decision support tool for fertilizer recommendations. A group of scientists conceived of FRST in 2018 to address the need to bring soil fertility data online on a national scale to bridge the gaps among differing fertilizer recommendations from state to state and to preserve historical soil test data over time. Earlier this year, the FRST decision aid became available online to the public. Available at https://frst.scinet.usda.gov/Tool, it consists of an interactive map and soil test correlation and calibration data for phosphorus (P) and potassium (K) trials from 21 crops in 40 states and Puerto Rico. The tool allows users to select nutrient, crop, location, soil series, and year and provides the critical P and K soil test value, the test level above which a yield increase is not expected with addition of fertilizer, as an output.

Interpreting and Supplementing State-Specific Fertilizer Guidelines

The tool can help users interpret and supplement state-specific fertilizer guidelines. For farmers and researchers working in multiple states, the same soil test value can elicit different recommendations on each side of the state line. “Because of the way [states] developed different models and different philosophies, the recommendations can be very different,” explains team member Deanna Osmond, a soil scientist and extension specialist at North Carolina State University.

To put together the tool, one of the team’s first tasks was to establish a minimum dataset, a threshold of requirements that data needed to clear to be included in the database. “We developed a set of guidelines for doing soil test correlation and calibration trials,” explains team leader Nathan Slaton, a CCA and the Assistant Director of the Arkansas Agricultural Experiment Station. Correlation studies identify when

nutrient concentrations in the soil reach a critical level past which a significant yield increase from fertilization is unlikely to be observed while calibration studies identify how much fertilizer is needed in the ranges under that threshold.

The FRST team divided the guidelines they created into two categories: “One is recommended, one is required, and then we also propose guidelines for researchers to use when they establish these trials that would enhance the utility,” Slaton says.

Developing the minimum dataset was a crucial, and lengthy, step in creating FRST. “I felt after our first meeting, ‘Maybe we’ll have to meet three times,’” laughs John Spargo, the Director of the Agricultural Analytical Services Lab at Penn State. “And [we met] monthly for at least a year and a half.” Though one of the project’s “biggest pain points,” the effort “ended up being very successful,” Osmond says.

In addition to providing unbiased and data-driven fertilizer recommendations, FRST serves as an archive of historical soil test data at risk of being lost as researchers retire and paper files are discarded. “Archiving the data was really important for us, so that we didn’t lose all that information,” Slaton says.

A Collaborative Effort With Ongoing Improvement

The project involves more than 100 collaborators from 45 land grants, four agencies within the USDA, several non-profits, and the private sector. “It’s the collaboration that makes this project strong,” Osmond says.

“Things like the soil test correlation modeling work, soil-sampling depth research, the soil acidity and lime recommendation validation project, the FRST collaboration has branched off into all of these ancillary products and efforts that, at the beginning, were not even on the long list,” says Spargo of the broader effort. “But now we’ve identified the need and have this structure for addressing them.” The database is intended to be

easy to use and easy to add new data to. It's also allowed the scientists to identify locations where trial data is lacking and where research efforts can be focused in the future.

The tool is intended to be used by everybody, the team says.

"We want the industry, including farmers, consultants, soil test lab personnel, and retail industry to use the tool. We want researchers to use it as well."

Slaton says. And though FRST is live online, the team is still hard at work adding to it, improving it, and soliciting feedback on what users would like to see in the tool. "It's version 1.0," Spargo says. They plan to add rate response information for P and K to help users select the minimum fertilizer rate that will produce the maximum crop yield and to expand into other crops and nutrients.

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