

# **Public Agricultural Services/Soil Testing Laboratories: Their value and contributions in the Land Grant University**

Inorganic chemical fertilizer application on US farms increased from very low levels to relatively high levels during the two to three decades after World War II. Increased fertilizer use greatly increased food and fiber production and helped raise the standard of living for all Americans. It was apparent well before the rapid expansion in fertilizer use that inexpensive ways to evaluate the fertility of a soil were needed to make more accurate fertilizer recommendations. During the expansion of fertilizer use, research on soil test development received considerable attention by Land Grant Universities. They established soil testing laboratories, with the goals of implementing the new tests and educating farmers about the value of soil testing. Also during this time, commercial soil testing companies began to assist in serving the agricultural community. Commercial labs quickly became more numerous due to the success of soil testing.

Over the past 30 to 40 years, there has been a steady decline in the number of public supported soil testing laboratories, most of them located at land grant universities in the US. The decline often has taken place during times of budget constraints when some land grant leaders determined that these laboratories are not as high a priority as other programs. Decision makers sometimes believed that private laboratories could do the testing work adequately, without the universities needing to support their own laboratories.

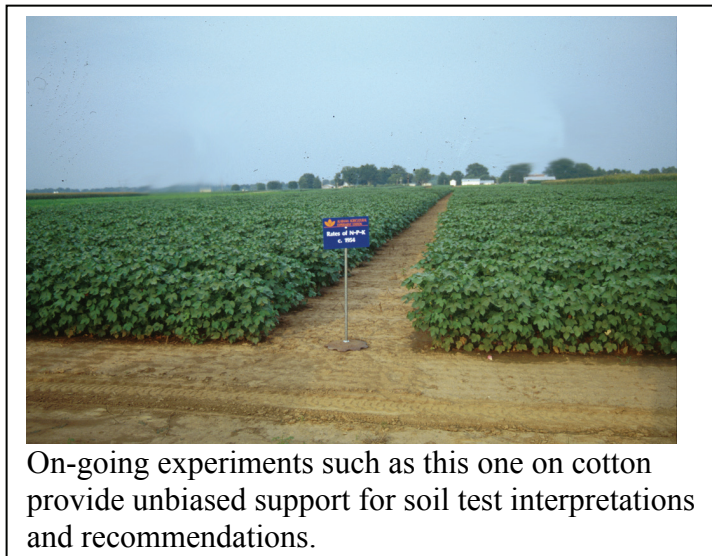
Because of this recent history of declining support of public soil testing laboratories, the SERA-6 committee believes it is time to describe their benefits to the

public. These laboratories often have evolved to provide many functions and services not provided by private laboratories that we will list and describe in more detail below:

**1. Public laboratories provide unbiased interpretations and fertilizer**

**recommendations.** The scientists working with Land Grant laboratories frequently carry out research on soil and plant test calibration. Soil and plant test calibration data are the basis for the plant nutrient recommendations provided with the analysis results of soils and plants.

Calibration data is sometimes incomplete because of the large amount of research required, along with insufficient funding for this work. It is not unusual for a laboratory to provide



On-going experiments such as this one on cotton provide unbiased support for soil test interpretations and recommendations.

recommendations for more than 200 different crops. Accurate calibration for each crop requires very detailed research work taking many years of study. Furthermore, due to changing varieties of crops, there is always a need to continue these calibration studies to verify and update them. Private analytical laboratories cannot afford the research support necessary to provide unbiased interpretations and recommendations. Without a healthy and active soil testing laboratory, the land grant university will soon lose its focus in providing leadership in the updating of soil and plant test calibration research. Soil test calibration data can be further evaluated by University

Economists to determine the most profitable return to the producer. This calibration data is not only important for making fertilizer recommendations for maximum economic yield, but also to avoid over-fertilization that can lead to environmental degradation.

**2. Public laboratories frequently have staff that carry out research in the development and modification of new testing methods.** As described above, public

laboratories serve as the focal point for plant nutrient calibration and related studies, so it is logical for the laboratory to also study, develop, and improve existing analytical methods. Furthermore, as new instrumentation becomes available, adaptation to analysis of soil, plant, and other materials is best done by public laboratories with highly qualified personnel who can properly and objectively evaluate



This poster was part of an exhibit on soil testing at a large Exposition on Deer and Turkey Hunting attended by over 5,000.

new instrumentation for use in this testing environment. All private agricultural services laboratories use procedures developed by public laboratories.

**3. Public laboratories provide education.** Because of the complexity of soil testing and the recommendations provided, education of the general public is needed on soil testing and related subjects. Having the laboratory as a focal point for plant nutrition related questions keeps the soil fertility specialist aware of the details of soil test

calibration and plant nutrient cycling research. The information from a testing laboratory is vital in assessing nutrition problems in economically important crops.

Information is just as important to prevent over fertilization and environmental degradation.

These laboratories also become a focus for national and international visitors because they exemplify the outreach



educational mission of a Land Grant University. Education is provided also for the many tests on other materials such as water outlined in number 4.

**4. Public laboratories offer many different analytical services.** In addition to soil

testing and plant analysis, public laboratories frequently offer many other analytical services including tests for water, animal and

environmental wastes, fertilizers, feeds and forage, pesticides, and

many more. For example, along with



Educational materials available to the general public.

household water test results for private well owners, one public laboratory provides clients with educational information on drinking water and human health through their County Extension programs. County program topics include treatment options if

water quality is sub-standard, and ways to reduce or eliminate potential contaminants in homes, farms, and businesses. In some public laboratories, additional diagnostic services are provided for identification and control of weed, insect and nematode infestations, or plant disease problems. This comprehensive approach would be difficult to match at a commercial level.

**5. Public laboratories provide opportunities for training students.** Public

agricultural services/soil testing laboratories are among the few places on a campus where future leaders are trained and educated about the complexities and the details of analytical procedures. Most land grant laboratories host students including at the high school level for a lab visit for familiarization or short trainings on the



basics of soil, water, and agricultural waste testing. This basic training is especially important for agricultural students planning careers in extension education, agricultural services, or farming. Students seeking advanced degrees (MS and PhD) can do their research on projects such as developing and modifying of laboratory procedures. These students will be future leaders in both public and private laboratories. The land grant universities would lose a key element in training future leaders without an agricultural service laboratory.

**6. Public laboratories help to educate the general public about the importance of land stewardship and its proper care and management.** Most public laboratories keep a database of soil and plant testing results from each county within their state, and some have a database of water test results. These data contain valuable information about our most important natural resources, the soil and water. Without the soil and water test database of the public laboratory, we would not know about the overall quality of these two natural resources on which we all depend.



Provide training to homeowners and extension agents.

**7. Public laboratories provide services to many clients that are not served by**

**private laboratories.** An example of this in many states are homeowners, who need soil testing services for lawns and gardens, services not readily available through private laboratories. Soil testing is one of the easiest ways to provide information to our urban and suburban residents about the



Master Gardeners provide thousands of hours of volunteer work through Land Grant programs. These volunteers depend on public analytical services to help them conduct their programs.

health of their lawns and gardens. It is a critical link in all state Master Gardener volunteer programs. When the public laboratory provides these services (soil and plant testing results, along with education of clients using the testing service), it helps to promote a more visually appealing and healthy environment in cities and towns.

**8. Public laboratories provide analytical services to University faculty engaged in various kinds of research.** Such services

are needed and serve as a reliable and consolidated resource for many faculty. Without them, faculty would have to do the analytical work in their own busy research laboratories. Providing this low cost research service is often a bonus of having a public service laboratory on campus. In many cases, faculty associated with the laboratory become collaborators in the research, because the analytical component of the research may require further development to meet the objectives of the project.



Both basic and applied field research requires soil testing and other analytical services from time to time. Routine services can best be provided through a low cost, public supported lab.

## Summary

Public agricultural services/soil testing laboratories provide many research and education services that are vital to a healthy land grant university. The faculty and staff associated with these laboratories are the developers and keepers of unbiased calibrations between soil test and plant analysis results and the fertilizer and lime recommendations provided

with each soil and plant test result. Research is also done on laboratory test methods as well, and these laboratories provide a real world work opportunity for students to learn. Faculty from public land grant laboratories also facilitate research across the college and university by providing analytical expertise and infrastructure, which allows research faculty to more successfully compete for grant funding and meet their research goals.

The faculty's involvement in research on soil, water, plant, and animal waste testing and interaction with faculty in associated agricultural disciplines must be a continuing program to identify and respond to changing analytical needs of the industry through the development and adoption of new methods and technology. Public laboratories enhance the level of service to the industry as well as contribute generally to the advancement in science and technology. Being in a science-based industry, the use of technology and science through research helps improve efficiency and increase profitability, reduce costs and meet compliance issues in a documented and defensible manner.

**Prepared by:**

David E. Kissel – University of Georgia

Charles Mitchell – Auburn University

Larry Oldham – Mississippi State University

Morteza Mozaffari – University of Arkansas

Gobi Huluka – Auburn University

Hugh Savoy – Tennessee State University

Leticia Sonon – University of Georgia