



Agilent Case Study: AgSource Laboratories

Analyzing Soils, Plants, Manures and Other Agricultural Samples To Determine Macro and Micro Elemental Nutrients

As a trusted partner for farmers, AgSource must always deliver accurate and timely analytical results

Agilent spoke to Charlotte Knors, Senior Laboratory Specialist at AgSource Laboratories' Bonduel, Wisconsin location. AgSource provides analytical services to a diverse range of clients including local crop consultants and agronomists, dairy farmers, municipalities, golf courses, and more. They serve clients in the USA and internationally.

Q. Can you tell us what AgSource does?

From six laboratory locations across the Midwest, AgSource analyzes soil, plant tissue, manure, fertilizer, water samples, and milk samples. We test for organic matter, pH, potassium, and phosphorus as well as other macronutrients such as calcium and magnesium. We also test for micronutrients, especially in plants or manure, nutrients such as iron, copper, magnesium, boron, and zinc. Even though they are at micro levels, they're important.

Q. What is the history of AgSource?

AgSource was formed in 1959 to serve dairy farmers through milk testing and records processing. In 1963, a laboratory in Bonduel, a very small community in Northeast Wisconsin, was built to analyze samples in that area. Over the years, the Bonduel location moved from testing milk to also testing animal feed and now soil, plants, manure, and fertilizer.

Manure analysis is important for understanding what is in the manure and what it can contribute to the soil. The nutrients in the soil will determine the yield of any plant or crop that is planted. Those crops are essential feed for animals, feed for humans, feed for all of us.

As AgSource has grown and expanded their range of tests, our instrumentation has grown as well. In today's world, it is very important that automation is up to speed and up to date. With 6,000 samples a day at the Bonduel location, we need to provide accurate results and deliver a fast turnaround time for sample analysis. I know I can rely on my instrumentation to deliver timely results that we can be proud of.



We test samples from the same farms year after year or month after month. With this large data set, our customers can compare results to previous testing, and it gives them confidence the results are accurate. If a customer has an issue and they're concerned about the accuracy, we retest at no cost to them. We are honest and open if anyone ever has any questions about sample results.

Q. What are your responsibilities at the lab?

My role focuses on the Agilent ICP-OES instruments. I run the analyses for macro and micronutrients in manure, soil, fertilizer, and plant tissues.

My job involves preparing and tagging samples. They are then dried and ground, added to an extracting solution and then filtered. Once filtration is complete, they are then analyzed on the Agilent ICP-OES. It is my job to prepare the instrument, make sure all the instrument calibrations are correct, and then perform the analysis.

Q. How many samples do you measure on a typical day?

We can analyze anywhere from 2,000 to a maximum of 6,000 samples in a day, depending on the time of the year. Spring and autumn are the busiest, with planting and harvesting occurring then.

We have farmers that drop off their own samples. The local community drops off their lawn and garden samples. We also have our own team of crop consultants that collect samples for farmers and then bring them back to us.

Q. Is your lab certified by any external bodies?

We are certified by the Wisconsin Department of Agriculture. The processes that we follow are certified or recommended by the State. We participate in proficiency programs including the North American Proficiency Testing, the Agriculture Laboratory Proficiency testing, and the Manure Analyzing Programs. We are also part of the American Laboratory Testing Association, a group that assesses laboratory performance based on performance in proficiency programs.

Q. Analytically, what's important to you?

Number one is accuracy. Time and time again, we want to be as accurate as possible and be able to reproduce that accuracy with those same samples that come in over time.

Reliability and traceability are also important. Turnaround time is also critical. We have a 24-hour turnaround time, which can be very important, especially during planting season or when farmers are applying manure to fields. It's a very critical time for the farmers that depend on us. In Wisconsin, there are specific times that manure can be applied, so farmers must abide by that. If they only have a week or two, and they have a large manure pit, they need to know what nutrients are in the manure. This information helps the farmers work out how much they should be applying to their fields. They need the information quickly.

Q. Why did you choose Agilent instruments?

We already had some Agilent instruments and our sister laboratories work with Agilent, so selecting another Agilent instrument was an easy choice. I've been working with Agilent equipment for the last four years, but we have had Agilent technology since 2010. We currently have three Agilent ICP-OES instruments from three different generations, the 700 series, a 5110, and the most recent a 5900, all with autosamplers. We have an Agilent AA instrument, as well, in another part of our laboratory. We experience hardly any instrument downtime, besides routine maintenance.

We look for results turnaround time, so the speed of the analysis is important. The reliability of an instrument is also very important. We do not have a lot of time for downtime if an instrument does go down. The AgSource laboratory here in Bonduel is a very small space, so we also look for equipment that is compact.

Q. Why did you buy a new ICP-OES?

During the busy season, our sample load is very heavy—up to 6,000 samples per day. We had two Agilent ICPs and if one needed maintenance, I only had one available to keep running samples. We purchased a third instrument to keep our turnaround times and our result accuracy at the levels we want to achieve.

During our day-to-day routine, we use two of the three instruments for our soil, plant, and manure samples. When the busy season comes around, I can use all three instruments and I can choose which instrument can be taken down for maintenance while the other two are running.

Q. What do you like about the Agilent ICP-OES instruments?

The software that Agilent provides with the instruments, especially the newer instruments, is very user-friendly. I can easily reload or relocate any older worksheets from months or years past.

The Agilent software offers a variety of options for me to adjust the accuracy or even the precision of measurements. There are several functions that I can use, whether that is adjusting calibrations or changing any of the measurement conditions.

Maintenance downtime, the time it takes to get the instrument ready for analysis, is very minimal. Any maintenance that is required is less than an hour, and it's usually only once a month. Maintenance tasks include changing pump tubing and cleaning the nebulizer, spray chamber components, and the torch.

The torch assembly and the torch alignment for the newer Agilent ICP-OES instruments is a lot easier than on older models. The torch itself is all one piece and it auto-aligns when I slide it into place. I can replace the torch, do the instrument calibrations, wavelength checks etc. and the instrument is ready to start measuring samples again.

Q. What other features of the instrument have you found to be beneficial?

I have utilized the IntelliQuant feature to optimize our established methods. For example, I used it to pick a better wavelength for boron analysis. Boron is one of the micronutrients that we have many sensitivity issues with.

We also use the NebAlert function. This function helps me determine if my nebulizer is starting to get clogged. If that happens, I must stop the analysis and clean the nebulizer. NebAlert saves me time—I can proactively identify the problem, do the maintenance, and get my analysis running again.

Another feature that I like on the 5900 instrument is the result outlier function. This function helps me flag any samples that have high percent RSD or whether my internal standard recovery is starting to climb, as well as any QC failures.

As a laboratory technician that is new to this environment, I highly recommend Agilent. Their 5900 instrument, with the newest software, is very user-friendly. All the features that I use day-to-day are very nice for someone that's never used Agilent before.

Working with the Agilent field service technicians or any of the tech support is easy. Most of the maintenance on Agilent ICPs I can do myself. If I do have any further questions or any other difficulties, I can reach out to any of the field service techs, or tech support very easily by email. I get response within a day. They treat me very nicely.

Currently, one of our instruments is having technical difficulties, and I have been able to reach out to Agilent tech support. One of the field techs that visited recently is in contact with me continuously throughout the day to help me try to figure this out. They work with us very closely to fix any issues without them having to come here, which saves us money. With the help of Agilent tech support, we can save time, money, and fix any type of hiccup as far as our analysis go.

Q. What keeps you motivated?

With every sample that I analyze, I make sure it's as accurate as if it were my own. I grew up in the agriculture industry and worked as a dairy farmer. I understand the importance of an accurate result.

I look forward most to what the future holds. There is a lot of talk about the climate. There is a lot of talk about understanding the soil a lot more. We have the instrumentation to help with these issues. We might not have the methodology yet, but we have ideas and enthusiasm and I think that's very exciting.

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