



## April Agronomy Update

# TISSUE TESTING



One diagnostic tool that we often overlook when making in-season agronomic decisions is tissue testing. Whether we are trying to diagnose a problem, looking at what impact a new product or production method has on a crop, or just assessing a fertility plan, tissue testing may be able to help. While soil testing is widely accepted as a method of checking in on a field's production capacity, tissue testing has not reached that same level of acceptance. There are many reasons for this. Logistically, it can be challenging to take proper samples at the correct crop stage and get the results back in a meaningful time frame. And sometimes we get those results back and are not quite sure how to interpret them, or know what the next steps should be. Not all labs have calibrated sufficiency levels for all of our crops, so sometimes all you get back are concentrations of nutrients found in the leaves without any context or recommendations to guide you on the next step. For these reasons (among others), tissue testing has often been reserved for trying to diagnose visual symptoms when something is going wrong in a crop. However, it can be a tool that gives us great insights into what is happening in our fields and has more uses than just being a last ditch attempt at identifying issues in the field.

Tissue tests need context to be of much use. That is why they are more helpful when used in comparing different parts of a field. You can learn a lot more from several tests taken in a single field than you can from single tests taken across several fields. Better yet is to use tissue testing in conjunction with a soil test. But when using tissue testing as a complement to a soil test, it's important to understand the capabilities and limitations of both to use them properly. A soil test measures soil nutrient supply and tries to predict it's availability to the crop, while a tissue test is measuring the actual nutrient uptake by the plant.

When people do use tissue testing, it's often with the view of attempting in-season corrections to their fertility plan. While there is valuable in that, be cautious about using tissue testing as the sole basis for a foliar application decision. The test may tell you what is deficient, but it can't tell you why. Many factors impact a plant's ability to take up nutrients. These include things such as soil moisture, the chemical and physical composition of the soil, and compaction just to name a few. So after you have identified a deficiency, you may discover you have limited ability to address it within the same growing season. There is also a difference between crop response to macro and micro nutrients; macros are needed in large amounts and don't respond well to a foliar application, needing to get into the soil where they can be taken up by roots. Dried out topsoil is going to require a rain to get any macronutrient to the roots; and some don't move well in the soil, making them even more unlikely to be effective in-season. Micros, on the other hand often respond very well as a foliar application. But sometimes it can be unclear how much of a micronutrient is needed to achieve a crop response, as the amount required can even be different between varieties within the same crop type. I'm certainly not implying that you shouldn't use tissue tests to discover nutrient deficiencies and treat them; I'm saying you should understand that you are dealing with a complex ecosystem. It's often best to start with a few fields, leave check strips and learn some valuable lessons before leaping into the financial commitment of a few thousand acres.

One area where we could make more use of tissue testing than we currently do is as a measuring stick of a fertility plan. Was the blend applied ahead of the crop sufficient for the requirements of the stand? Was the balance correct? Assessing these factors can give us a head start on next year's fertility plan. For example, a soil test taken on the Battle River Training Field prior to seeding wheat a couple of years ago estimated soil phosphate levels as high, yet the tissue test taken at the end of tillering (Figure 1) told me that the amounts being taken up were lower than expected. Based on soil tests alone, I had been ready to move on from a build strategy on phosphate to a maintenance strategy. The tissue test was clearly telling me that the soil tests overestimated the availability of phosphate on this field and that I should continue to build reserves until I start seeing more phosphate making its way into the plants.

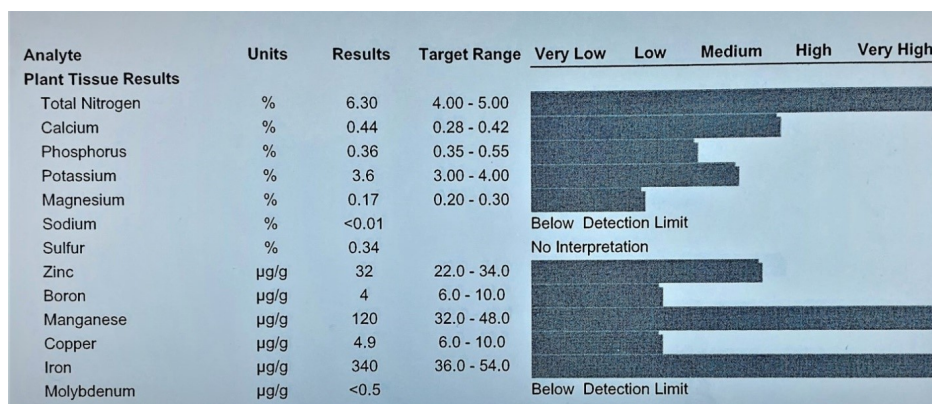


Figure 1: Wheat – Battle River Training Field June 2021 (Element Labs)

The tissue test also confirmed that whatever production issues I may have seen on the field that year, nitrogen availability was not one of them, and my applied rate of nitrogen in the fertilizer blend was likely more than adequate. In future years, I may want to follow up with a later season tissue test comparing older leaves to the newest ones. This may give me some insights into whether or not my fertility plan is providing season long supplies of nitrogen, or if the crop is being forced to cannibalize nutrients from the lower leaves later in the season. If you are using a nitrogen stabilizer or ESN as part of your program, this can also be a good way to check on whether or not you are getting a bang for your buck from your investment in those products. The tissue test also confirmed several things the soil test report was telling me. This field will soon have an issue with

magnesium, a rare problem in these parts. It also tells me that copper and boron are approaching levels that will need to be addressed in the future and that I would be well advised to start looking into the costs and benefits of granular micronutrients as compared to foliar applications.

As you can see, the value of a tissue test extends beyond what it can do for you in terms of dealing with in-season issues. It can help identify holes in your nutrient program, expose "hidden hungers" that may be affecting crop performance without giving you any visual clues, and help explain why crops sometimes don't live up to yield or quality expectations that we had for them.



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Wayne has recently been certified to oversee and sign off on 4R Acres at Battle River Implements.

More information will be in our Monthly BRI newsletter coming out soon.

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