



Plant Language: Diagnosing Trace Element Deficiencies

by Wayne Smith

TECHNIQUE

Wayne Smith is an agronomy consultant (and beef farmer) based in Albany, Western Australia.

Prompted by Smith, we are finding micronutrient deficiencies are alarmingly common in Kansas wheat and other crops. We would do well to heed Smith's 'language' lessons.

Does No-till Make Trace Element Deficiencies Worse?

When you start no-till after years of degrading the soil structure (cultivation and erosion), your plant's roots will grow more slowly in the no-tilled soil than in the cultivated soil because the soil is more compacted and less structured. It takes time for stubble retention and undisturbed underground biology to do their repair work to the soil. Therefore your plants will be more prone to root diseases and trace element deficiencies in the first few years of no-till.

Another phenomenon is also at work. Initially, the mulch and soil organic matter that build under no-till will be 'sinks' for nitrogen and trace elements held in those materials until they once again cycle into forms available to your plants. This nutrient cycling is done by biological processes, and the increased mass of these organisms per land unit must be 'fed' also, since their bodies are composed primarily of the same nutrients needed for plants. It is a common observation that a little extra nitrogen is needed in the first few years of no-till because of this. Later on though, it is a common result that less fertiliser is needed as the now bigger volume of organic material releases its nutrients to the crops, i.e.,

fertiliser inputs needed (per unit of grain produced) become less than they were under cultivation.

Having been through this with my clients on soils that are deficient in everything except sand, 😊



Photo by Wayne Smith.

Photo 1. Leaf tipping on oats due to copper deficiency. (Freezes weren't involved.) Note the twisting of the dead tissue.

my strong advice is to be pedantic on trace element nutrition and root diseases in the first few years of no-till. Also, never cultivate the soil again because that will just take you back to ground zero. Get past those first few years with well-fertilised plants and you will quickly start gaining the extra profits that are waiting for you.

Learning Plant Language

I consider it crucial to know what your plant is saying it needs. For plant nutrition, usually we just think about supplying nitrogen and phosphate.

However, the biggest 'bang for your buck' is from trace elements. You can be 20% out (low) in the phosphate and nitrogen application rates without affecting yields significantly, but you can lose 20% of yield with no visual symptoms if the crop is lacking in a trace element like copper, molybdenum, zinc, or manganese.

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On my trip to Kansas in April 2006, every wheat paddock I was shown had clear symptoms of copper and/or zinc deficiency. (Editors: To our knowledge, Ray Ward was the first to propose copper deficiency in Kansas wheat in '04, although those were severe cases of deficiency. Smith is skilled at detecting the less-obvious cases.) Numerous plant tissue tests and subsequent observations by Matt Hagny confirmed the deficiencies.

So what do you look for in a cereal crop? Firstly, unless a crop is droughted or has endured extreme sub-freezing temperatures, the plant should be green from top to bottom when the heads begin to emerge. There should be no dead spots on leaves, no dead leaf tips, and definitely no dead leaves. Any symptoms like that when the crop is not droughted should be seen as a sign you do not have things right yet.