

Management Plan to Lessen or Eliminate Tar Spot in Corn

A quiet fact in the Ag world is that herbicides mostly function by chelating or tying up important minerals to shut down a plant process or enzyme system. The world's most commonly used herbicide was first patented by a Stauffer physical chemist in 1974 as a mineral chelator, destined for use in industrial cooling towers and coolant pipes. Thus Monsanto chose to patent it as a shikimate pathway inhibitor to avoid patent infringement.

Now that you have read Dr. Huber's interpretation of the tissue analytical results of the leaf and spots from the 'Tar Spot' infected plant, you need to develop your action plan to avoid the dollar losses due to the tar spots appearing on your plants. Missy Bauer, assistant field agronomist with Farm Journal, told of situations where losses of 75 to 100 Bu/A were attributed to this disease were seen in Michigan corn fields in 2021. This was according to an article in the Farm Journal press on 10/26/2021.

To this point no plant pathologist has reported performing a mineral analysis on the leaves or lesions. They seem oblivious to the connection between mineral levels and plant diseases. We performed the analysis using an X-Ray Defraction instrument developed by Bruker Instrument Company and repurposed by a top soil microbiologist (Jill C). It can analyze any material, plant part, grain sample, soil or food product for all minerals heavier than an atomic weight of 12 within 30 seconds. Dr. Huber, author of the top selling reference book entitled 'Mineral Nutrition and Plant Disease', is recognized as the worldwide plant disease expert with tons of experience in plant nutrition, physiology and soil chemistry. He lent his expertise to this project and study. What stood out to him first were the very low levels of Cu, Zn and S. Second were the Mn levels which averaged close to 10,000 ppm, versus the normal range of 20 to 200 ppm. That is like having a heart beat rate of 6,000 bpm instead of 60, or driving 6,600 mph instead of 60 mph. Something had malfunctioned within the plant and requires action to analyze and understand problem, then propose available and affordable solutions.

The Phyllacora fungus had been seen before, but remained a mild fungus in all other cases. What changed? On page 1 Don talked about how when the Cu, Zn and Sulfur levels are all very low, the plants are unable to form the lactate enzyme and ended unable to process the Mn that was being pulled into the plants into the usable form. The plants end up depositing the MnOxide on the leaf surfaces or within intra-cellular spaces. This Mn is referred to as Birnessite and the spots are not lesions. This would explain why they cannot be scraped off and do not sporulate. Similar symptoms are seen on other crops in different parts of the world. This includes oil palms, banana plants, sugar cane and in corn.

A sound management plan will start with having an up-to-date soil analysis that includes Cu-Zn-Mo-S. If these are low be sure to apply a mix containing them before or at planting, or with an in-season foliar program. If you have seen tar spot symptoms in past seasons, tissue test at V5 to V7 to see if the critical mineral level needs are being met. As the plants enter the rapid growth stage their mineral needs increase. You need to monitor tissue levels and

possibly test again at V12 to V14 to see again if critical tissue levels are being met. We expect to acquire these levels from a researcher who has been using a Bruker scanner on different crops at varying growth stages. If any broad spectrum, chelating herbicides are applied (with glyphosate being #1) to the crops, distinguishing between plant available and unavailable chelated minerals is a job that can only be done on a Synchrotron, as at the Brookhaven facility on Long Island, which I have visited. Farmers have to weigh their aversion to a 2022 repeat.

Ideally the form of minerals we would like to use to meet the identified plant needs could be liquids or powders. Ideally they would enter the plant within a few hours, be totally systemic, and offer curative action. The role of these minerals is to bolster the activity of the plants immune systems. Each of the Mn, Cu, Bo, Fe and Zn products play a role in maintaining plant health. Each of those minerals were included in the Dithiocarbamate fungicides. The companies identified as offering products that fit this need are: Albion/Balchem, headquartered in Utah with a production plant near Algona, IA, and: Spraytec from Maringa, Sao Paulo State, Brazil. Albion provides both liquids and powders with the latter being OMRI approved. The quality they offer is of ISO 9000 standards with the powders dissolving instantly with no settling. The powders can be easier to work with due to fewer lbs of product needing to be moved. The products from Spraytec are primarily packaged in metric poly containers. They are produced using medical grade minerals in a newer facility under exact standards.

Both sets of products dissolve well and can be tank mixed with companion partners. If a grower hates to not use a traditional fungicide, either the mentioned set of products can be mixed with a traditional fungicide to boost residual length while a required level of comfort is developed by the grower. In the case of Spraytec, they saw their products used in heavily diseased areas of Brazil and Paraguay to reduce the risk of risk of non-performance by hard chemistry due to the development of resistant strains of pathogens.

The management of Tar Spot will rely on corn growers monitoring mineral levels in their plants during the season, especially before key stages of development. Any deficiencies below critical levels will require action to counter those deficiencies. Typically if Tar Spot increases in incidence and severity, other fungi can invade the weakened plants. The most critical stage will be prior to reproduction when mineral demands are the highest. This is why many growers mentioned that the severity of the symptoms increased near the reproductive stage.

As soil organic matter and CEC levels decline the mineral holding capacity of the soil will be lowered. Plants can subsequently slip into deficiency status quicker and oftener. Use of biologicals to increase minerals release will be important to the growth and production of healthy plants. Any products that lower OM or decimate biological activity increase the risk of plant diseases becoming more of a threat to producing healthy crops. Highly mineralized, energy rich plants are less likely to be affected by diseases and insects.

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