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Timely Manganese Application Can Boost Soybean Yields

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Adding manganese to soybeans can significantly increase yield when this micronutrient is a limiting factor — and it often is in much of the U.S.

The question is how to apply it.

“Manganese is our No. 1 issue here from a fertility standpoint,” says Troy Jenkins, a certified crop adviser and agronomist with North Central Co-op, in Rochester, Ind. “We have soils that are naturally extremely high in iron and soils that are black sands to muck with extremely high phosphorus levels.” The fields tend to be high in pH and extremely high in organic matter. This is the type of soil complex that ties up manganese, making it unavailable to plants. Yields can suffer mightily. Jenkins estimates about half the farmers he advises in the Rochester area experience some level of manganese deficiency in their soybeans.

LOOK FOR SYMPTOMS

The 50-cent term for the main symptom of manganese shortage is “interveinal chlorosis.” That’s a yellowing of younger leaves between the veins, and then brown or black spots where they rot, and finally, loss of yield. It’s sometimes mistaken for the discoloration shown when there’s insufficient iron. “You hear people say the leaves take on an olive-green or a mustard-yellow color,” says James Camberato, Purdue University Extension agronomist. He says iron deficiency turns the plants a brighter yellow. In areas like northern Indiana, where soils are high in organic matter, there may be yield differences of 15 bushels per acre when manganese is added to deficient crops. Without the application, “It [manganese deficiency] can be so severe in areas of a field that you make no yield or single-digit bushels per acre,” Camberato says.

APPLICATION TIMING To overcome the problem, Jenkins says his Indiana clients commonly spray foliar applications of manganese alone or with glyphosate up to five times per season. They begin just before

flowering, when symptoms start to appear. “The first application can occur as early as V5,” Jenkins says. “The rate would be very low, about 0.13 pounds per acre [of] actual manganese. Another would normally occur with a glyphosate application at 0.20 pounds per acre. As soybeans mature, we would normally increase the rate of manganese to no more than 2.8 pounds per acre. We never spray past the R5 stage.” Manganese — not to be confused with the macronutrient magnesium — is one of the 16 elements essential to plant production. Since manganese is needed in small amounts, it is considered a micronutrient, according to a paper written for DuPont Pioneer’s “Crop Insights” publication by Pioneer area agronomist Keith Diedrick. Manganese has important roles in plant development, including a vital role in photosynthesis. Agronomists say it is key to deploy a combination of soil tests and in-season tissue analyses to gauge manganese levels.

In some areas of the nation — the western soybean belt, for example — manganese is applied with a starter fertilizer. But that wouldn’t work in Indiana. Camberato explains foliar applications work better than when applied with a starter fertilizer. “Applying manganese fertilizer in a band as a starter enhances its availability, but it eventually becomes unavailable in the soil again,” he says. However, there are regional and climatic limitations to foliar applications, says Dorivar Ruiz Diaz, assistant professor of soil fertility at Kansas State University. A foliar application of manganese “is one way to do in-season application, and it helps a little if you find out in time that you need it,” he says of his experiences in Kansas. However, the high temperatures and low relative humidity found in the western end of the Corn Belt can limit uptake of nutrients from foliar applications.

“We’re not seeing the benefit of foliar application when it’s hot and dry,” he says. In recent trials, Kansas State University scientists have seen more benefits from applying manganese and other micronutrients as a starter fertilizer with the seed, Ruiz Diaz says. Kansas soils are less likely to tie up manganese. Where manganese is used in the starter fertilizer, it is added based on soil tests. Generally, ½ to 1 pound per acre is common.

GLYPHOSATE AND MANGANESE

In the mid-2000s, there was concern that using glyphosate-resistant varieties may have been associated with a deficiency of the micronutrient manganese. The subject caused a flurry of field trials and discussion a few years ago. Today, the issue has largely gone away. “Our work shows there’s not really a clear relationship between the Roundup Ready gene and manganese deficiency in soybeans,” says Dorivar Ruiz Diaz, assistant professor of soil fertility at Kansas State University. “I don’t think it’s an issue from what we are seeing.” Was it the Roundup Ready gene or the glyphosate application itself that allegedly caused the manganese deficiency?

“Basically a combination,” says Ruiz Diaz, although the answer wasn’t crystal clear. “Apparently, some people found some sort of relation at one point,” he says. Several companies market products that can be added to tank mixes of glyphosate and manganese, making them more compatible.

- See more at: <http://agfax.com/2013/08/01/timely-manganese-application-can-boost-soybean-yields/#sthash.4ztGQ8XE.c1rihQs5.dpuf>