Society Science

Soybean Does Not Respond to Micronutrient Application

Deficiency of micronutrients can significantly reduce crop yield, quality, and economic return. In 2016, soybean was harvested from 3.04 million ha in Minnesota. In recent years, there has been increased pressure for farmers to apply micronutrients to soybean due to a perception that deficiencies have increased.

In the May–June issue of the Agronomy Journal, University of Minnesota researchers reported on four-year-long studies from 35 sites where soybean response to broadcast applications of B, Cl, Mn, and Zn were evaluated.

Results indicated that B, Cl, and Zn applied before planting were readily taken up by soybean plants. Trifoliate nutrient concentration increased by the application of each respective nutrient except Mn. Addition of B, Cl, and Zn did not increase soybean grain yield and had a marginal impact on soybean grain quality. Critical soil and plant tissue test levels could not be established due to the lack of a grain yield response across the varying tissue and soil test concentrations.

Results from these studies indicated that the need for micronutrients to increase soybean grain yield is unlikely except potentially for Mn where a response to Mn may be possible when the DTPA test is <20 mg kg⁻¹. Iron is the only micronutrient that has a greater impact on soybean profitability for the Northern and Western Corn Belt.


Arbuscular Mycorrhizal Fungi Not Inhibited by Seed-Applied Fungicides

Fungicidal seed coatings have become standard on commodity crop seed to control pathogenic fungi prior to germination. However, seed-applied fungicidal formulations containing multiple systemic ingredients targeting multiple metabolic processes may inhibit non-target soil fungi such as obligate plant symbiotic arbuscular mycorrhizal (AM) fungi.

In an article recently published in Agronomy Journal, researchers report on the potential for contemporary, seed-applied fungicidal formulations to inhibit AM fungal root colonization or alter plant nutrient content of corn (Zea mays L.), soybean [Glycine max (L.) Merr.], and oat (Avena sativa L.). Multiple genotypes of each crop were examined.

The authors report that commercial fungicidal seed coatings applied at their labeled rate did not significantly reduce root colonization by AM fungi or plant nutrient content compared with the untreated control. However, there were differences among fungicidal treatments in AM fungal colonization or plant nutrient content for all three crops. Plant genotype significantly affected colonization and plant nutrient content for the crops studied.

Low fungicide doses and seed application may be factors in the limited response of AM fungi and plants to contemporary, seed-applied fungicidal formulations. The potential for non-target effects of seed-applied fungicides has been an ongoing concern of producers who are interested in promoting soil biological diversity and function.


Magnified view of stained arbuscules, vesicles, and filaments of arbuscular mycorrhizal fungi within the cortex of plant roots.

Soybean. Source: Flickr/ellenm1.

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