



## **North Central Soybean Research Program**

### **Micronutrients for soybean production: A position paper for the North Central Region**

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Soybean growers in the region are asking many questions concerning possible soybean yield loss due to deficiency of micronutrients. Growers, crop consultants, and extension agronomists are frustrated, however, because there are few extension publications that address micronutrient issues. This is mainly because the available research is very old or funding has limited the scope of recent research at each state.

The goal of this new multi-state project is to gather information across key states of the North Central region and prepare a regional position paper on rational use of micronutrients for soybean production.

#### **Project Objectives**

- Find, analyze, and summarize published and unpublished land-grant university field response-based information about soybean need for micronutrients and the value of both soil and plant tissue analyses in the North Central region.
- Prepare and publish a regional position paper addressing the most important issues concerning use of micronutrients for soybean production in the North Central region.

#### **Reporting Period Accomplishments**

We have gathered peer-reviewed published information about soybean response to micronutrients application in the north-central region. We also collected published research in articles that are difficult to find or access, such as conference proceedings, research bulletins, and project reports.

Considerable time was dedicated to summarize the information so it could be evaluated for its relevance to the project and to be used in the planned regional publication, if appropriate. We made a special effort to summarize unpublished results of major projects that have been initiated in the last four to five years in Iowa, Kansas, Indiana, Wisconsin and Minnesota. Relevant information from

these projects has been tabulated for its study and use in the planned publication. This include information such as authors, year, micronutrients investigated, type of application, major soil properties or series, use of soil and/or plant-tissue testing, and occurrence of a yield response or not.

We already began sharing to producers and crop consultants the preliminary results of recently and important micronutrients research conducted in the region. In November 2015 we shared results from Indiana, Iowa, Kansas, Minnesota and Wisconsin at the North-Central Extension-Industry Soil Fertility Conference in Des Moines, Iowa. This conference is targeted mainly to extension personnel, applied researchers, crop consultants, and nutrient management planners of the north-central region. There were 224 attendees, and a proceedings article was published (see [Micronutrients fertilization for corn and soybean: A research update](#) by Mallarino, A.P., J.J. Camberato, D.E. Kaiser, C.A.M. Laboski, D.A. Ruiz-Diaz, and T.J. Vyn, 2015).

The information collected has indicated that the likelihood of soybean yield response to micronutrients is small across the entire region except in specific soils and/or for specific micronutrients in some specific soils or conditions, and that use of sufficiency levels for soil or plant-tissue tests being suggested in the mainly old literature may encourage unneeded fertilization.

Deficiencies of several micronutrients are commonly observed in sandy, coarse textured soils. Soybean iron deficiency chlorosis (IDC) is frequently observed in high-pH (calcareous) soils in the western area of the region, and recent research being summarized shows that newly available products and methods of application have good potential to alleviate deficiencies.

Manganese deficiency in soybean sometimes is observed in north-central region states east of Illinois and Wisconsin. However, the information also has indicated the challenge of identifying specific responsive fields by soil or tissue testing given significant impacts of transient and temporally variable soil properties such as moisture and aeration on manganese plant-availability.

Another important conclusion is that high-yielding soybean can remove high amounts of micronutrients with harvested grain, but the yield level or the yield potential alone is not a good indicator for micronutrient fertilizer requirements. Therefore, major concepts to be included in the publication will be the inadequacy of published sufficiency levels for some micronutrients for soil or tissue tests, needed updates of existing interpretations for the most useful tests, and that for some micronutrients decisions about fertilization could be better made by targeting fields with soils which traditionally have been identified as having a likelihood of yield response to micronutrients such as sandy, calcareous, organic, or severely eroded soils.

The project is in its ending phase, and we hope to complete the regional publication by March 31, 2017.