

AGR1601: Improved Iron Chelates for Treatment of Iron Chlorosis in Saskatchewan Pulse and Fruit Crops

Iron chlorosis, the yellowing of crop plant leaves associated with iron deficiency, is a growing problem in Saskatchewan pulse crops. This disorder leads to significantly lowered crop yields and disease susceptibility, and is a particular problem in the increasingly important soybean sector (~0.8 million acres farmed in Saskatchewan, ~7.3 acres farmed nationally). Current treatments for iron chlorosis are ineffective and there is clear need for better approaches for treating pulse crops. The goal of project AGR1601 was to develop and test a new, highly-effective treatment for iron chlorosis. Our new treatment is an iron-enriched foliar spray that adheres to crop leaves and allows efficient iron uptake into the plant. The key component of the foliar spray was a newly-synthesized chemical reagent called an anionic gemini surfactant; this is a brand new compound that has excellent agrichemical properties and has never before been used for agricultural applications.

This project was proof-of-concept development work in which we synthesized several variants of the gemini surfactant, formulated the foliar spray and then tested it under small-scale, greenhouse conditions. The foliar spray was tested on two different soybean cultivars and two different pea cultivars. Under all conditions explored, our new foliar spray significantly increased iron levels in plant leaves and stems above that found in untreated control samples, as well as samples treated with a commercial comparison spray. Two different gemini surfactants were tested, and both performed equally well. While the treatment worked, two shortcomings of this study were encountered. The first was a chemical challenge, which required us to apply the reagent in two steps, a pre-spray with the gemini surfactant followed by a second iron-enriched spray. The second challenge was that the number of plants that could be tested in greenhouse studies was small and we will need to test the spray under larger scale, field conditions to more carefully assess how well the spray performs and to assess its overall impact on crop yields. Nonetheless, the treatment was successful and appears to hold excellent potential for treating iron chlorosis.