Checkoff-Funded Project: The Minnesota Challenge: Interactions between SCN and IDC

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Soybean cyst nematode (SCN) and iron deficiency chlorosis (IDC) are likely the two largest maladies of soybean in Minnesota. In the case of SCN, the nematodes reduce yield by penetrating and feeding on the roots robbing the plant of energy; whereas in IDC, the plants become stressed due to a lack of available iron which is important for plant photosynthesis.

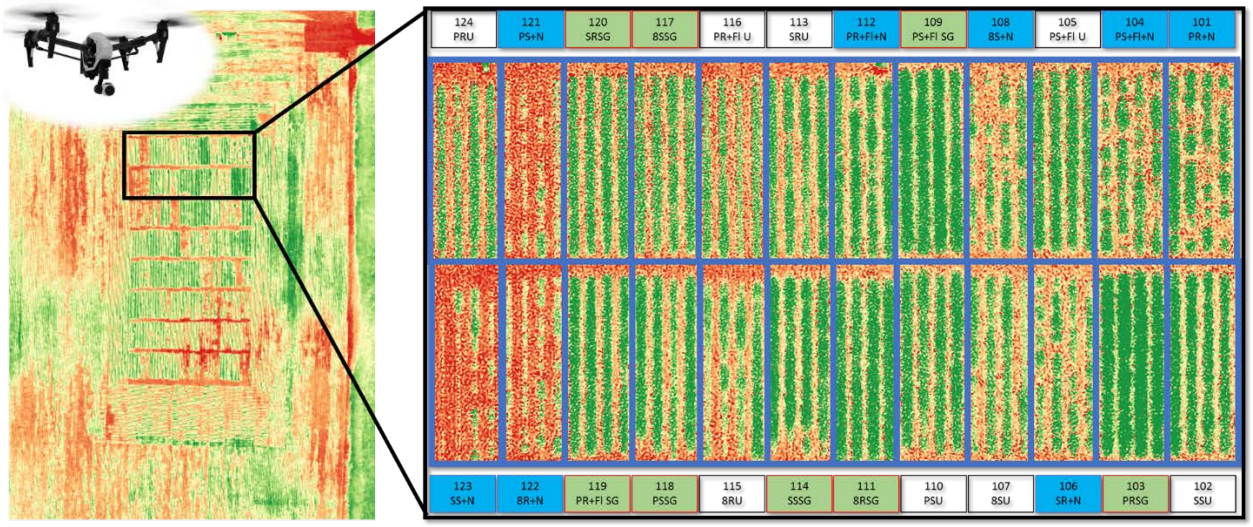
When yellow spots occur in fields, many farmers blame IDC, but SCN may also be playing a role as well. In fact, the two stresses may be acting together to make problems worse. We will not make significant research progress investigating either issue without controlling for the other. The highly variable nature of both makes setting up research trials difficult and often renders results difficult to interpret. It is imperative that we develop research methods to allow us to separate the effects of IDC from SCN in the field.

In the summer of 2017, a field experiment was designed to create a range IDC and SCN stress. Through personal communication with farmers, soil samples, and historical satellite imagery, we identified three farms for the study which had documented histories of both IDC and SCN. A range of treatments were added to specific plots to change the levels of IDC and SCN stress. Urea was added to a subset of plots to induce IDC stress and iron chelates were added to another subset to alleviate IDC stress.

We selected varieties resistant and susceptible to SCN to create a range in SCN stress. These treatments successfully created a range of IDC and SCN visual severity symptoms independently, and significant yield differences were recorded. In addition, our results showed new evidence of the importance of variety selection for these issues individually and we documented evidence of the breakdown of the 88788 SCN resistance source. We were also able to visualize and accurately quantify these treatment effects on the soybean canopy using drone-based imagery.

Continuing this work in 2018 will allow us to validate our preliminary results and fine-tune our location selection to ensure that we have good (and concurrent) IDC and SCN pressure. We have identified 4 field locations for 2018, on which significant SCN levels have already been confirmed. The same range of treatments will be applied and data will be collected throughout the summer. Visual severity ratings as well as drone based remote sensing data will be collected

from these plots as in 2017. Overall, we hope to gain a better understanding of the relative impacts of IDC and SCN individually in order to develop comprehensive management plans. In addition, results from this study will be a great resource to researchers who wish to study IDC or SCN independently.



With urea, iron chelates, and genetic tolerance or resistance to IDC and SCN, we are able to investigate the contributions of IDC and SCN individually and together on soybean canopy development, greenness, and ultimately – yield.