Saskatchewan AgriARM Applied Research Management

Wheatland Conservation Area Inc.
Swift Current, SK.

Demonstrating Inoculant Requirements and Foliar Fungicide Effects on Soybeans
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ADOPT 2015

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Final Report

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2015 Report

Project Objectives

The objectives of this project are to first, demonstrate the effects of high rates of granular inoculant, and second, to show the effects of foliar fungicide applications relating to both maturity and seed yield of soybeans.

Project Rationale

While both interest and acres in soybeans are growing rapidly in Saskatchewan, growers and agronomists alike have relatively little experience with this crop in our environment. There is increasing evidence and general acceptance that double inoculating (full rates of both liquid and granular inoculant) is beneficial and some suggest that granular inoculant exceeding those on the label (in addition to seed-applied inoculant) may even be warranted. On the other hand, granular inoculants add considerable costs to seeding soybeans and, particularly if temperatures are limiting, could potentially delay maturity.

With regard to fungicide application, it is generally recommended that soybean growers in Saskatchewan avoid applying foliar fungicides because disease has not typically been a disease limiting factor in our province and unnecessary use of fungicide could delay soybean maturity. However, septoria brown spot and bacterial blight can affect soybeans in our cool environment, therefore growers may be tempted to apply a fungicide and, provided that moisture and temperatures are not limiting, there may even be benefits to doing so.

This project will benefit producers by adding to a limited database and providing a forum for discussion on the importance of inoculation with soybeans, particularly in Saskatchewan where this crop has not been historically grown. It will also address questions on fungicide application and likely demonstrate that these are not required for soybeans in Saskatchewan and can probably be avoided under most circumstances. This demonstration will provide both an opportunity to discuss important issues for new soybean growers in Saskatchewan while generating important response data to guide future recommendations.

Methods

The inoculant and fungicide treatments were arranged in a split plot design with fungicide as the main plot, inoculant treatments as the sub-plots and four replicates. The inoculant treatments included:

1) 0 granular inoculant
2) 1X granular inoculant
3) 2X granular inoculant and
4) 4X granular inoculant.

The foliar fungicide treatments were:

1) no fungicide
2) 0.16 l/ac Headline applied at early flowering (1-2 weeks past first flower).

The plots were seeded into durum wheat stubble using a Fabro cone seeder. All seed was treated with a liquid inoculant and seed treatment, planted at a rate of 210,000 seeds/ac and the variety was a very early maturing and glyphosate tolerant. Weeds were controlled using a pre-seed burnoff (w/CleanStart), in-crop application(s) of glyphosate and additional chemistries at the first application. Fungicides were applied using a plot sprayer and the centre rows of each plot were harvested with a plot combine.

The following measurements were taken:

-Days to 1st 5% of pods turned
-Days to 95% of pods turned
-Seed yield
-Seed Size

List of operations included:

01-May Pre-Seed Burnoff with Clean Start (Credit 360 g ae/acre + Aim @ 30 ml/ac)

Previous crop: Durum Wheat

12-May Seeded Trial Fabro built plot drill, 9 openers x 9 inch row spacing, atomjet knife openers
Soybean Variety: 23-10RY ***All soybeans had liquid Cell Tech Inoculant (75ml/27kg seed)***
Seed Rate: 210,000 seeds/acre
Fertility: 40 lbs of P2O5 (11-51-0) sidebanded

Soybean Cell Tech Granular Inoculant Rates

1X= 4.7 lbs/ac
2X= 9.4 lbs/ac
4X= 18.8 lb/ac

10-Jun Emergence counts 2 rows x 50cm x 3 sites per plot

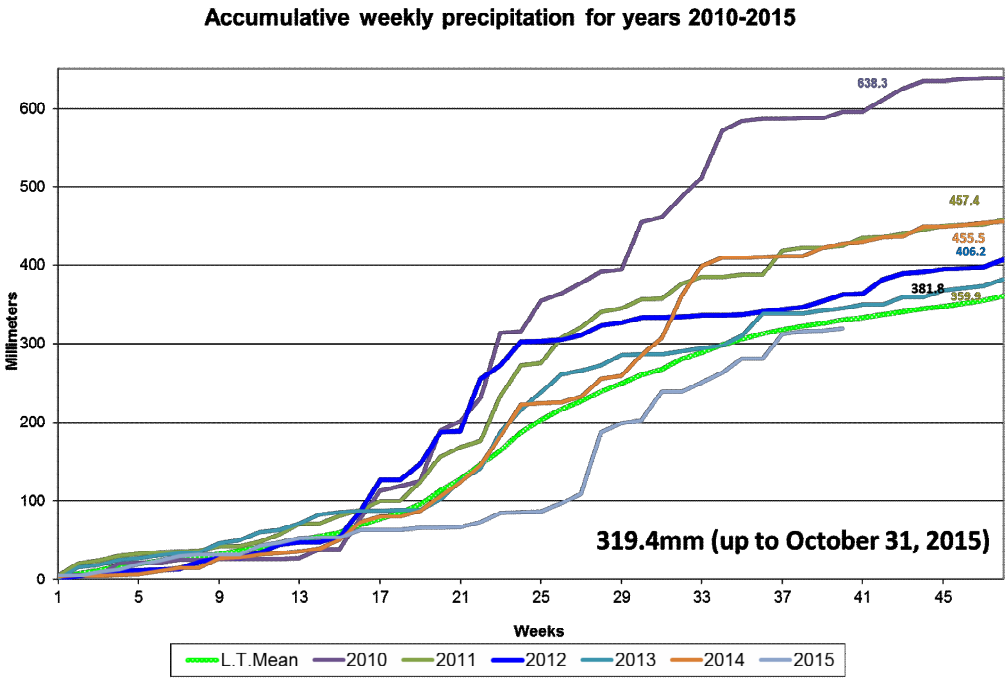
24-Jun Incrop Sprayed Odyssey 17.3g/ac + Poast ULTRA @ 190 ml/ac + Merge @ .5 l/100L

10-Jul Sprayed Treatments requiring Fungicide with Headline @ 160 ml/ac (early flower)

14-Jul Sprayed Incrop with RT540 @ .67 l/ac

07-Oct Combined all plots (6 Row)

General Site Conditions



Graph 1. Accumulative weekly precipitation for years 2010-2015.

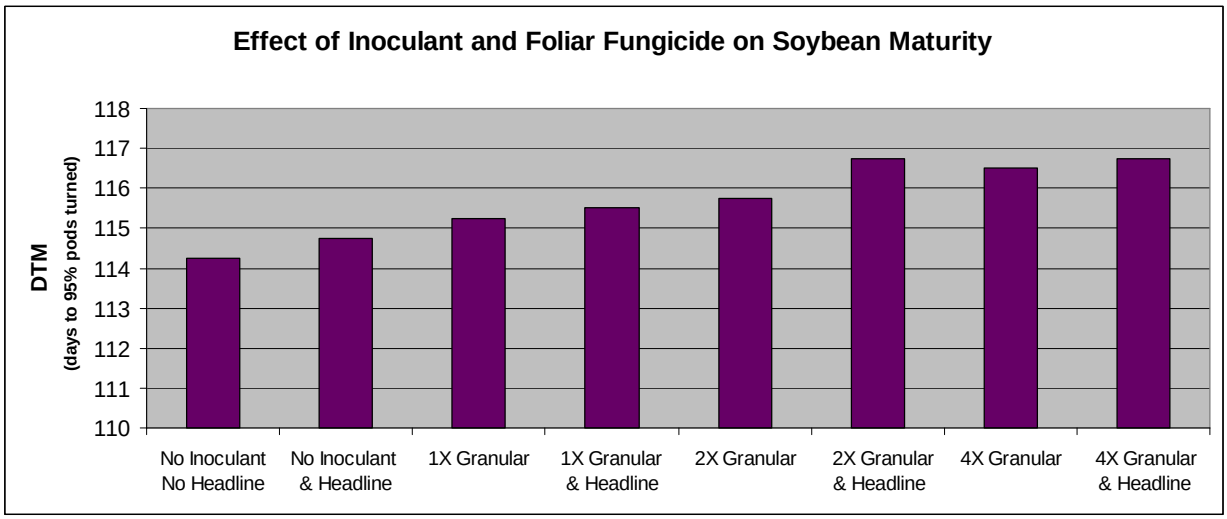
The site is situated 1 mile south of Swift Current. The soil is classified as a Swinton silty loam. For the most part in 2015, lower than average precipitation in the early growing season had a negative impact for shallow seeded crops. Severe drought like conditions continued through May, June, and July having a negative effect on yield potential and made it difficult to show treatment responses in certain trials. Overall yields for oilseed crops were lower than average due to lack of rain fall. Deeper seeded cereal crops had close to average yields. This was generally the case for area producers who experienced similar conditions resulting in similar yields.

Results

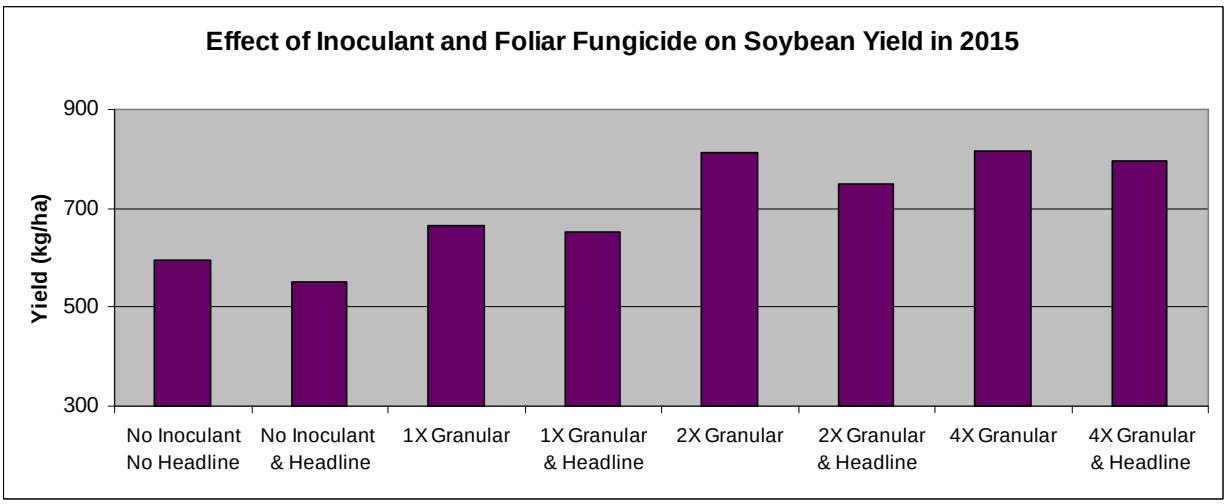
In 2015, disease pressure was very low due to the lack of spring precipitation and the dry conditions experienced throughout the growing season. These conditions make it difficult to initiate any potential response from the fungicide treatments. Even in the absence of disease, the fungicide applications appeared to slightly delay maturity (Graph 2.), suggesting a slightly healthier plant, however, did not contribute to any type of positive yield response (Graph 3.).

We saw both a yield response and a seed size response from the inoculant rate treatments. The data from this trial, as well as other soybean trials we ran in 2015, shows both a yield and seed size benefit by double inoculating (liquid on the seed plus granular in the furrow). We also see further yield and seed size benefits at the 2X and 4X granular inoculanr rates (Graphs 3 and 4).

Graph 2.



Graph 3.



Graph 4.

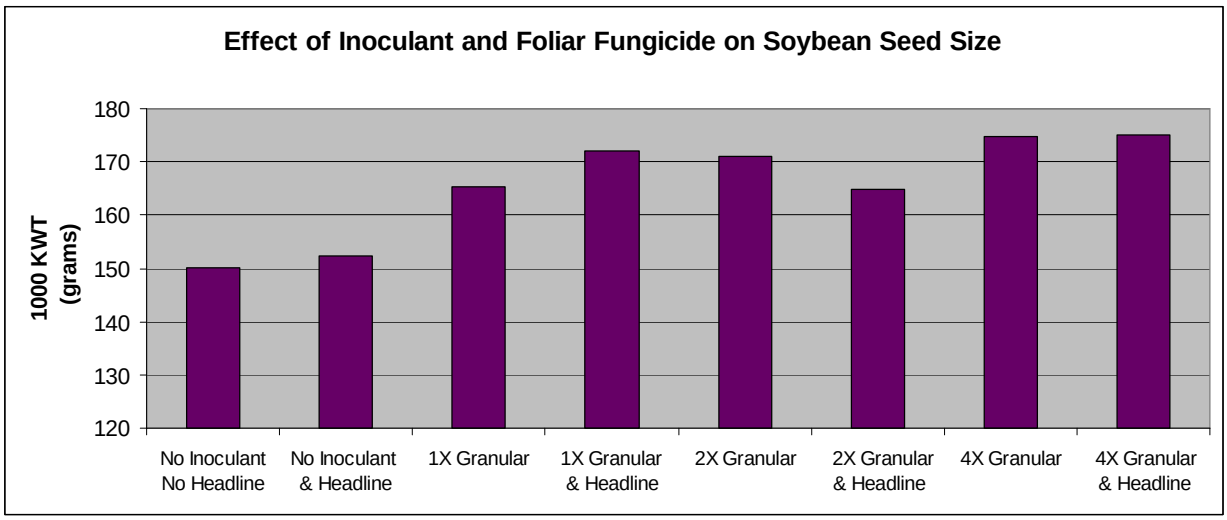


Photo 1.

No Granular or Fungicide

Photo 2.

4x Granular with Headline @ Early Flower

Conclusions

More work needs to be done before soybeans become a commonly used rotational crop in Saskatchewan, however, producers wanting to grow the crop on a small scale have some good initial background information to utilize. One factor that jumps out time and time again are the benefits gained by of double inoculating. We see from this trial, and other trials we have run recently, that inoculating both the seed and the furrow improved nodulation and yield. We also saw a further yield benefits at the 2X and 4X granular inoculant rates, however, with our drought induced low yields from this trial, there was little to no economic benefit to using these higher rates. At $8.00 per bushel soybean and $10.00 per acre for a 1X rate of granular inoculant, a producer would need an 85 kg/ha increase in yield to pay for the extra granular inoculant in the 2X treatment. Since we realized a 115 kg/ha increase at the 2X rate a producer would just barely pay for the extra inocutant. You would require a 250 kg/ha increase in yield to pay for the extra granular inoculant in the 4X treatment. Since we only realized a 140 kg/ha increase at the 4X rate a producer would not pay for the extra inoculant.

Due to drought conditions and the absense of disease, the fungicide treatments were non-responsive. More detailed analysis over more years and locations will need to done in this area.

Acknowledgements

We thank the Ministry of Agriculture for all our ADOPT projects including plot signage and verbal acknowledgement at field days and on PowerPoint slides during presentations. This will continue at each venue where an extension activity occurs. We also thank Shannon Chant (Saskatchewan Ministry of Agriculture) for her help.

Summary

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There is increasing evidence and general acceptance that double inoculating is beneficial and some suggest that granular inoculant exceeding those on the label may even be warranted. With regard to fungicide application, it is generally recommended that soybean growers in Saskatchewan avoid applying foliar fungicides because disease has not typically been a disease limiting factor in our province and unnecessary use of fungicide could delay soybean maturity. However, septoria brown spot and bacterial blight can affect soybeans in our cool environment. This project will benefit producers by adding to a limited database and providing a forum for discussion on the role of fungicides and inoculants in soybeans, particularly in Saskatchewan where this crop has not been historically grown.

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This project will be promoted during Crop Production Week in Saskatoon in January and locally at Cropportunities 2016 on March 3rd in Swift Current (200+ expected participants). This project was promoted on a CKSW radio program called "Walk the Plots" which we broadcast in the summer on a weekly basis. As well this topic was brought to the attention of the group on the Annual Field Day on July 16th (100 participants) as well as a number of smaller individual tours. This topic will also be posted on our website.