



Spring Input Decision-Making: Applying Research to the Farm



Your source for soybean and pulse crop agronomy and research

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DO YOU FEEL confident in your spring input decisions? Growing a successful soybean crop involves more than managing spring inputs. But starting your soybean crop off strong in spring is important for success, despite the ability of soybean plants to compensate for growth later on.

There currently exists a range of soybean growers in Manitoba, from brand new to very experienced. Expertise aside, confidence in our ability to grow successful crops stems from an interest to learn more and a willingness to incorporate these findings into management decisions. We have seen a steady output of soybean research results at the university, government and farm levels in Manitoba, in response to the expansion of soybean acres. It is from this continuing flow of research that Manitoba-specific, best management practices are developed. And from which we can add confidence to our decision-making in the spring.

What is the best seeding rate for my soybeans? Should they be single or double inoculated? Is seed treatment necessary and how effective is it? If you are asking these questions, we have data for that in Manitoba.

SEEDING RATE

It is first important to distinguish between target plant population, seeding rate and actual plant population. The target plant population is the number of plants per unit area (plants/ac) that you need to establish in the field for maximized yield and competitive ability against weeds. The seeding rate is the number of seeds per unit area (seeds/ac) that are planted to achieve the target plant population. And finally, the actual plant population is the number of live plants established per unit area (live plants/ac) in the field.

What should your target plant population be for soybeans? Farmers are becoming more interested in reducing seeding rates due to high soybean seed costs. However, crop competitive ability, yield potential and economic return should all be considered in this decision. Research conducted by Dr. Ramona Mohr of Agriculture and Agri-Food Canada (AAFC) determined that 160,000 live plants/ac resulted in maximum soybean yield across 13 site-years in Manitoba. This research has been built into a seeding rate calculator found in the MPSC Bean App to calculate your economic optimum plant population and seeding rate. Most often, the economic optimum ranges from 140,000 to 160,000 plants/ac according to the app, depending on grain price, seed cost and expected yield.

To calculate seeding rate, expected seed survival, or percentage emergence, must be factored in. This means that seeding rates are typically greater than the target plant populations. Seed survival may include seed quality factors such as percentage germination, moisture or seed coat cracks, expected loss from equipment and handling, seedbed conditions and pest pressure. Assessing actual plant population each season and good record-keeping will then give you an indication of accuracy,

so you can adjust future seeding rates and save money down the line.

INOCULANT

Many questions surrounding soybean inoculation continue to be asked in Manitoba. Research is currently underway at the University of Manitoba by Dr. Ivan Oresnik, examining the effects of crop rotation and overwintering on the persistence of *Bradyrhizobium japonicum* in Manitoba soils. Preliminary results show that *B. japonicum* populations decline as the number of years without inoculation increase; however, bacterial populations are not reduced to zero. Stay tuned for more results on this project.

Other research results on soybean inoculation are available in Manitoba from the farm-level. An On-Farm Network project was initiated to answer the question: Is double inoculation necessary for fields with a history of soybeans? Only fields with at least a two-year history of soybeans were included in this study, located mainly in the eastern half of Manitoba from 2013 to 2015. Out of 25 site-years collected throughout this project, only two resulted in a significant positive yield response to double inoculation (Figure 1). This means that a significant

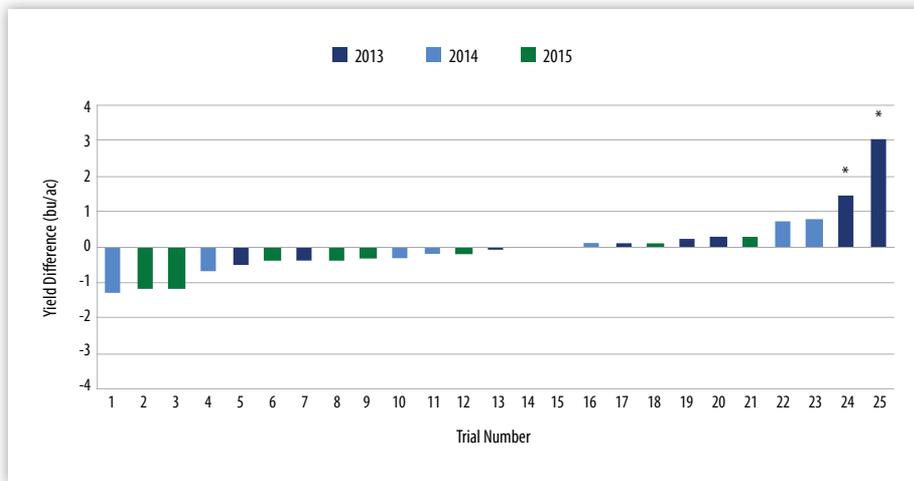
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CHECKLIST FOR SINGLE INOCULATION

- Field has had at least two previous soybean crops
- Previous soybean crops have nodulated well
- Most recent soybean crop within the past four years
- No significant flooding or drought
- All four above criteria have been met

▼ Figure 1. Soybean yield response to double versus single inoculation across 25 site-years from On-Farm Network research in Manitoba. *Denotes statistical significance.



yield bump from double inoculation occurred only 8% of the time, compared to single inoculation. This project is planned to continue into western Manitoba, as more fields develop a history of soybeans.

Consider these results and refer to the MSPG *Soybean Fertility Fact Sheet* for recommendations on double versus single inoculation. The single inoculation checklist on the previous page, provides a conservative set of criteria to help guide your decision.

SEED TREATMENT

Seed treatments are an important production tool for protection of fields at an elevated risk of early-season

disease and/or insect pests. As the neonicotinoid insecticide component of seed treatment (i.e., thiamethoxam) is under re-evaluation by the PMRA, it is important to ensure responsible use of these products. Further, questions surrounding the need for seed treatment have arisen, including the economic impact and risk of early-season soybean pests in Manitoba.

Research results are available from an On-Farm Network project that examined treated versus untreated soybeans. This project involved a combination of soybean crops that received fungicide plus insecticide or fungicide-only seed treatment. Out of 28 site-years examined from 2015 to

2017, only four resulted in a significant positive soybean yield response to seed treatment (Figure 2). Therefore, seed treatment produced a significant yield bump only 15% of the time. Interestingly, significant responses were seen only in 2015. This suggests that environmental conditions specific to 2015 may have contributed to these responses at select locations.

It is likely that the need for seed treatment may increase over time with increasing pest pressure from frequent soybean production. Therefore, field scouting each year is essential to determine the changing level of risk associated with early-season pests. But over the short term, these On-Farm Network research results should be considered when making spring input decisions.

SUMMARY

Discussed in this article are three examples of spring input decisions faced by soybean growers and the best management practices for each, derived from Manitoba-based research. It is recommended to follow these and other best management practices for improved productivity, profitability, efficiency and sustainability. With more research comes more information added to the pool of knowledge. In some cases, this may change our best management practices. Therefore, it is important to be willing to adapt your management decisions over time with the most current information. For example, MSPG plans to combine soybean plant population research from the University of Manitoba with the research from AAFC.

To learn more about individual sites included in the inoculation and seed treatment projects discussed here, refer to the new On-Farm Network database of single-site research reports found at www.manitobapulse.ca. This easy-to-use database allows you to sort and search for reports according to crop, year, trial type and region. Each report includes field and crop management information as well as individual site results. ■

▼ Figure 2. Soybean yield response to treated versus untreated seed across 28 site-years from On-Farm Network research in Manitoba. *Denotes statistical significance.

