MANITOBA Pulse Soybean GROWERS

Soybean Seed Treatment Risk Assessment

Seed treatments are a production tool that can improve crop establishment and productivity. For soybeans, they are currently available as a fungicide-only, or combined with a neonicotinoid insecticide. This risk assessment was developed to help farmers and agronomists identify where seed treatments are most likely to be beneficial by describing the factors that influence soil insect populations and fungal pathogens. The targeted use of seed treatments supports an integrated pest management approach, which takes into consideration both economic and environmental factors.

NOTE: Imidacloprid is currently under re-evaluation by the Pesticide Management Regulatory Agency (PMRA).

For each soybean field, review the risk factors and considerations outlined in the table below to determine your risk of early-season insect pests. If your risk is low, consider ordering and planting fungicide-only, or bare seed.

Considerations for using a fungicide-only seed treatment:

- Fungicide seed treatment can help provide control over seedling and root rot pathogens in soybeans, including *Rhizoctonia solani, Fusarium spp.*, *Pythium spp.*, and *Phytophthora sojae*. It is important to remember that seed treatment can only provide protection for two to three weeks beginning at the time of planting (not emergence). These diseases can also cause issues later in the season if conditions are conducive for infection; therefore, seed treatment is not a complete solution.
- Fungicide seed treatment can be of greater benefit if there is a history of seedling disease or root rot, or if conditions are cool and wet at planting. Overall, planting into warm, well-drained soils at the proper depth (0.75"–1.5") will allow the plant to quickly emerge and have vigorous plant growth. A strong, healthy plant is better equipped to defend itself against disease if conditions become less than ideal later in the growing season.
- Crop rotation is important to reduce seedling disease and root rot from *Phytophthora sojae* (the causal agent of Phytophthora root rot in soybeans) because soybean is the only host plant. Other common pathogens that cause seedling disease and root rot (*Fusarium spp.*) have a wide host range.

Insect risks in soybeans that may be reduced by an insecticide seed treatment.

WIREWORMS[1]

Risk Factors	Things to Consider
• History of wireworm infestations. • Seeding into cold soils. • Some species of wireworms may potentially be more common in fields following conversion from grasslands. • Wireworms are most attracted to and survive best in sandy to silty soil types.	• Can be present in field from previous year. • Current seed treatments result in low mortality of wireworms but reduce feeding early in the season. • Economic levels are sporadic over time, across regions and within fields.

SEEDCORN MAGGOT

Risk Factors	Things to Consider
• Tillage incorporating live plants (cover crops, heavy weed growth) into the soil prior to seeding. • Recent application of manure in the spring. • Seeding into cool, wet soil causing delayed emergence.	• Sporadic pests of soybeans. Usually only at damaging levels when tillage and manure application practices provide attractive egg-laying sites. • Economic levels are sporadic over time, across regions and within fields.

Insect risks in soybeans that are not likely to be reduced by an insecticide seed treatment.

SOYBEAN APHID

Risk Factors	Things to Consider
• Soybean aphids are not known to overwinter in Manitoba[2], and are not present every year. When soybean aphids are present in Manitoba, they generally arrive in July/August, outside of the effective seed treatment window.	• When economic threshold has been reached, the recommended method of control by entomologists across North America is the use of foliar insecticide during the R1 to R5 crop stages. • Seed treatments only provide protection for the very early V-stages of soybeans[3], when soybean aphids have historically not been present in Manitoba.

CUTWORMS

- Current insecticide-based seed treatments on soybeans do not provide effective control of cutworms.
- Cutworm populations should be monitored regardless of seed treatment choice.

BEAN LEAF BEETLE

- Although the bean leaf beetle is on the label of some seed treatments for soybeans, established populations of bean leaf beetle are NOT known to occur in Manitoba.

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Research Highlights

To determine the impact of soybean seed treatment on crop establishment, yield and profitability, 18 replicated On-Farm Network strip trials comparing treated vs. untreated soybean seed were conducted from 2015 to 2016. The seed treatment used was either CruiserMaxx + Vibrance500S or EverGol Energy + Stress Shield 600, both of which contain a fungicide and insecticide component. All trials were conducted in fields with a history of soybean production and varying crop rotation, management and soil type. Seeding dates ranged from May 2 to May 31 and results are shown in Figure 1. Average crop establishment (live plants at V1/seeding rate) did not differ between treated (88%) and untreated (87%). The average yield difference between treated and untreated seed was 1 bu/ ac and ranged from -1.4 bu/ac to +5.3 bu/ac at individual trial sites. With a seed treatment cost of $10/unit, soybean price of $11/bu, seeding rate of 190,000 seeds/ac and an average yield difference of 1 bu/ac, the use of a fungicide + insecticide seed treatment is not economical based on these results. Using an individual site analysis, the probability of a significant economic response to the use of a fungicide + insecticide seed treatment is four out of 18 sites (22%). There was no specific factor (seeding date, seed treatment brand, crop establishment, previous crop) that corresponded to the sites with a positive economic response. This research will be continued in 2017.

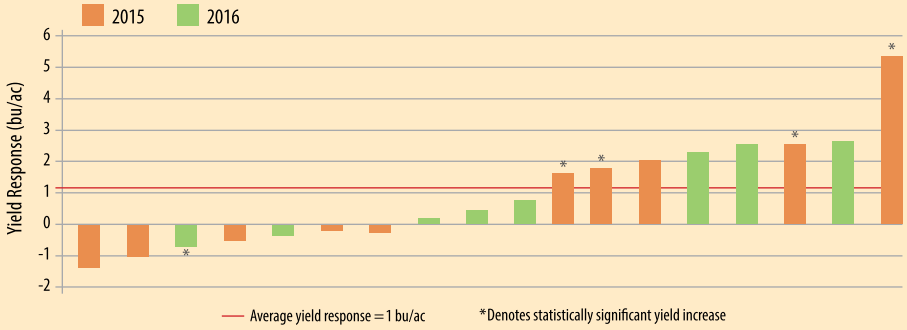

Figure 1. Yield response of treated versus untreated soybean seed across 18 eastern Manitoba On-Farm Network trials in 2015 and 2016.

For each soybean field, review the risk factors and considerations to determine your risk of seedling diseases and root rots. Prevention strategies include crop rotation and genetic resistance of soybean varieties (if available). It is important to remember that seed treatment is only effective until the very early V-stages.

It is difficult to distinguish root rot pathogens from one another. Shared symptoms include poor emergence and root development, yellowing, discoloured roots, and lesions on the root or stem tissue near the soil line.

Disease risks in soybeans that may be reduced by a fungicide seed treatment.

PYTHIUM SPP., RHIZOCTONIA SOLANI, FUSARIUM SPP.

Risk Factors	Things to Consider
• Moist to wet soil. • Cold soil is conducive to *Pythium spp.* • Warm soil is conducive to *Rhizoctonia solani* and *Fusarium spp.*	• Roots must be examined to help distinguish between these diseases. Pathogens should be confirmed by laboratory testing. • Soybeans are most susceptible to these pathogens during the early V-stages.

PHYTOPHTHORA ROOT ROT (*PHYTOPHTHORA SOJAE*)

Risk Factors	Things to Consider
• Warm, wet soil. • Frequent soybean production throughout the crop rotation cycle. • Susceptible varieties.	• Soybeans are susceptible to PRR at any growth stage. • Resistance genes are available for PRR races 4, 25, 28, and 3. Consult the *Pulse and Soybean Variety Evaluation Guide* or *Seed Manitoba* for resistant varieties. • Some symptoms of PRR are unique compared to other root rots and seedling diseases (see left).

Further Reading

[1] Wireworms on Crops in the Canadian Prairies. http://www.gov.mb.ca/agriculture/crops/insects/wireworms.html

[2] McCornack et. al. 2005. Physiological constraints on the overwintering potential of the soybean aphid (Homoptera: Aphididae). Environmental Entomology. 34: 235–240.

[3] McCornack, B.P. and Ragsdale, D.W. 2006. Efficacy of thiamethoxam to suppress soybean aphid populations in Minnesota soybeans. Crop Management. doi: 10.1094/CM-2006-0915-01-RS.

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