The Bean Report

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MANITOBA Pulse Soybean GROWERS

This Issue:

Quick Links:

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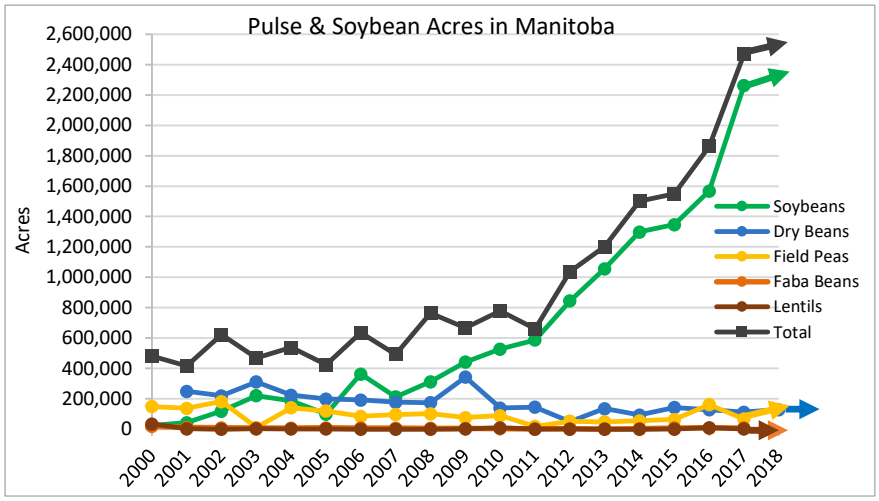
Field Pea Production Guidelines

Projected Pulse and Soybean Acres



- Soybean acreage is expected to increase slightly in 2018, up from 2.29 million acres in 2017.
- Dry bean acreage is expected to remain approximately the same as 2017 at 136,000 acres.
- Field pea acres are expected to increase slightly in 2018, from 65,000 acres grown in 2017.
- Faba beans and lentils are also expected to continue in 2018 at approximately 10,000 acres, collectively.

Monitoring Wireworms

Wireworms are elusive insect pests of all field crops in Manitoba. They are the larvae of click beetles (Figure 1). Numerous related species can be found across the Prairies and larval generations can survive for four to 11 years in soil, depending on the species. Crops with wireworm infestation will exhibit symptoms of poor plant establishment. Wireworms cause damage by feeding on germinating seeds and underground parts of seedlings.

Natural enemies of wireworms include ground and rove beetles, larvae of stiletto flies (which resemble wireworms), fungal pathogens and some species of nematodes. Anything that contributes to rapid germination and seedling growth will help protect your crop from damage. Seed treatments are registered, but no economic thresholds have been established. Monitoring populations is challenging due to spatial variability and limited knowledge of wireworm distribution in Manitoba. Wireworm trapping is also difficult to do on a large scale.

MPSG is supporting a new wireworm project, led by Dr. Bryan Cassone at Brandon University. This project will explore wireworm monitoring techniques for improved sampling and survey efforts, to determine the wireworm species composition and to assess the damage inflicted on soybean crops in Manitoba.

Figure 1. Click beetle/adult (top) and wireworms/larvae (bottom).

Photos: Jim Hahn, UMN Extension and Mike Dolinski, Field Crop and Forage Pests and their Natural Enemies in W. Canada.

We are currently looking for fields with suspected presence of wireworms to contribute to this research. Wireworm monitoring will begin prior seeding. If you have a field you would like us to monitor, please contact MPSG Production Specialists, Cassandra Tkachuk and Laryssa Stevenson.

Considerations for Dry Seeding Conditions

In 2017, Manitoba experienced a lack of precipitation, exhausting the root zone soil moisture in many locations. This was dramatically different from surplus soil moisture experienced in 2016. As we shift our thinking to dry conditions, there are several crop and soil management considerations to keep in mind.

Herbicide Carryover

The risk of residual herbicide carryover is elevated in dry years, due to inadequate moisture for the breakdown of chemicals by microbial action. Watch out for products containing clopyralid (e.g., Prestige XC/XL, Curtail M, Cirpreme, Lontrel 360, Eclipse III) in rotations containing peas, soybeans and dry beans, which requires >175mm of precipitation in the year of application for successful microbial breakdown. This breakdown also requires adequate temperatures (20°C is ideal). Refer to the re-cropping restrictions table (pg. 77) in the Guide to Field Crop Protection, herbicide carryover risk map (Figure 2), field records and consult with product labels and reps to ensure your crops are not at-risk of damage from previously-applied chemicals.

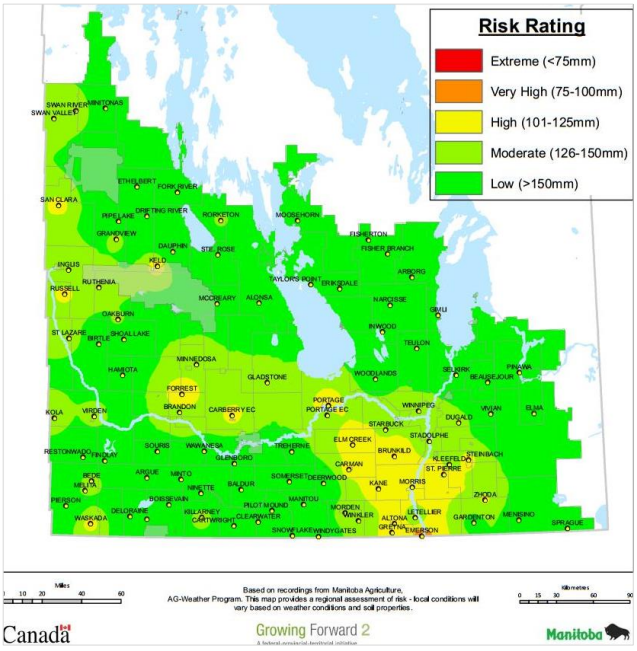


Figure 2. Risk of greater than expected herbicide carryover, based on rainfall from June 1 to September, 2017.

Tillage & Field Operations

Minimize the number and intensity of tillage and field operations under dry soil conditions to prevent soil erosion, loss of organic matter and any moisture that is present. This includes product applications (e.g., fertilizer, herbicide) that require incorporation. Direct seeding and no-till are optimal when dealing with dry soil.

Salinity

High water tables bring soluble salts closer to the soil surface by capillary action. In subsequent dry years, salts are left behind without adequate precipitation to wash them down. It is in these dry years that they can have the greatest impact on susceptible crops. Soil salinity generally reduces root growth, water uptake and overall nutrient uptake. It is also a key player in iron deficiency chlorosis (IDC) of soybeans, along with high calcium carbonate levels, and likely the cause of widespread IDC symptoms in 2017 (Figure 3). Assess soil test soluble salt levels to determine your risk of crop injury. Soybeans and pulses all have low tolerance to salinity.[1] For fields that are classified as even slightly saline (1-2 mmhos/cm)[2], consider growing IDC-tolerant soybean varieties (Soybean Variety Guide) or more salt-tolerant crops.[1]

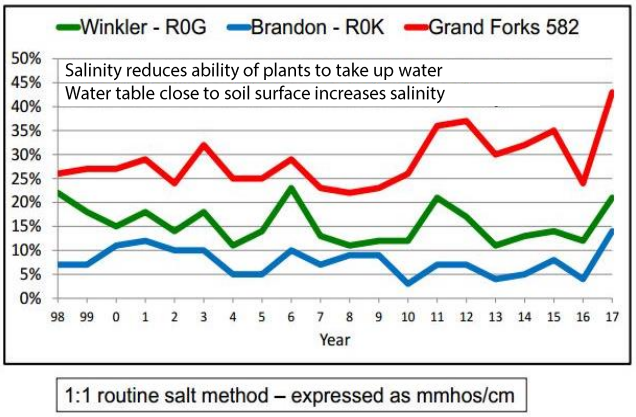


Figure 3. Percentage of Manitoba samples testing with salt levels greater than 1.0 mmhos/cm (Source: Agvise Laboratories).

Seeding Date, Depth and Rate

There are three general options for seeding date and depth management in dry soil: 1) dust it in at normal depth and date, 2) seed deeper into moisture, or 3) wait for rain then plant. It is recommended to do what you can to ensure pulse and soybean seed receives adequate moisture for germination. Stick as close as possible to optimum planting dates for pulse and soybean crops, regardless of dry soil. Late planting of early-seeded crops such as peas and faba beans, can cause a serious yield penalty that may outweigh an uneven plant stand due to dry soil. This of course depends on the timing of spring rainfall, but waiting for rain can be a risky practice.

The recommended seeding depth ranges are ½" to 1 ½" for soybeans, ¾" to 2" for dry beans, 1 ½" to 2" for field peas and 2" to 3" for faba beans. Pulse crops have larger seeds and can withstand deeper planting, in general. Therefore, aim to plant at the deep end of each range under dry conditions, or into moisture if possible. Finally, consider heavier seeding rates to compensate for reduced seed survival under dry soil conditions. Seed survival will vary by seed lot, equipment/handling and field. Use the MPSG Bean App Seeding Rate Calculator to determine the most economic seeding rate, while factoring in the appropriate seed survival value.

References
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2 Manitoba Agriculture. 2008. Soil management guide. https://www.gov.mb.ca/agriculture/environment/soil-management/soil-management-guide/pubs/soil-management-guide.pdf

Curbing Disease Pressure in Peas

Figure 4. *Fusarium oxysporum* symptoms include plant stunting and chlorosis at the tops of plants, and necrosis of root tissue.

Although 2018 is setting itself up to be a dry year, disease management should remain a priority for pea growers. In 2017, one third of surveyed pea fields had root rot symptoms that were severe enough to cause yield loss, despite relatively dry growing conditions.[1] The survey found *Fusarium avenaceum* present in all 35 sampled fields and Fusarium wilt (*F. oxysporum*) (Figure 4) present in 74% of fields.[1] Most annual legume, cereal and oilseed crops are hosts for Fusarium, so crop rotation as a control option has limited value.[2]

Fusarium

Fusarium species are primarily soil-borne. Under cool and wet conditions that favour development, seed treatments can be used to control early season infection. One study found that metalaxyl-based fungicide seed treatment consistently increased seedling emergence, nodulation and seed yield, and reduced root rot severity in greenhouse and field trials inoculated with *F. avenaceum*.[3] Conversely, under limited disease pressure on fields with no history of field peas, another study found that neither metalaxyl nor dithiocarbamate fungicide seed treatment had any positive effect on pea yields.[4] Practices that improve overall plant vigour, such as early planting dates, well drained fields, disease-free seed and adequate crop nutrition used in combination can reduce the impact of root rot.[2] Use of seed treatment is also recommended if Fusarium levels (in addition to Botrytis and Sclerotinia) exceed 10% on the seed source.[5]

Aphanomyces

Aphanomyces root rot was detected in 77% and 48% of fields surveyed in 2016 and 2017, respectively.[1] Appropriately named a "water mould," Aphanomyces favours wet or waterlogged soils, which explains the higher incidence of the disease in 2016 compared to 2017. To confirm the presence of Aphanomyces in your field, conduct a soil test ahead of planting.

Labs with available soil testing services for Aphanomyces:

- BioVision Seed Labs
- Discovery Seed Labs
- 20/20 Seed Labs

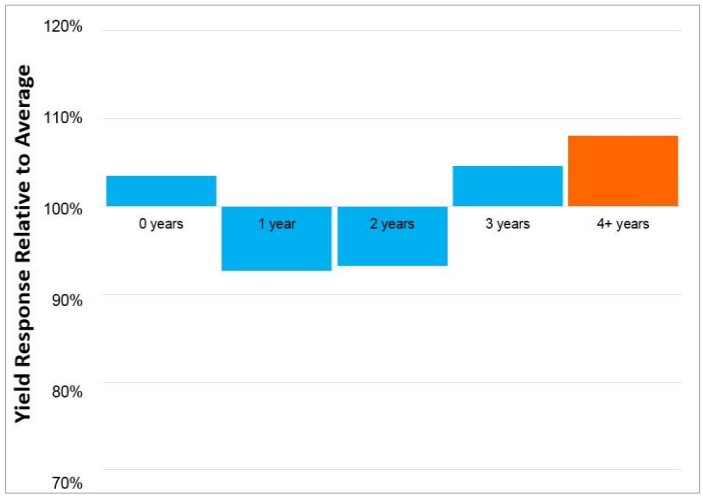

Figure 5. Yield response of field peas to crop rotation break periods from peas in Manitoba (MASC 2000-2016).

Crop rotation is key for managing *Aphanomyces euteiches* root rot in peas. Long-term data from MASC (2000-2016) shows that at least four years between pea crops produced higher yields than tighter pea rotations (Figure 5). Dormant oospores can remain in soils for many years, so those infested with *A. euteiches* should be planted to a non-host crop for a minimum of six years to avoid buildup of disease inoculum. Lentils, alfalfa and dry beans are also susceptible, faba beans are tolerant and soybeans, other oilseeds and cereals are resistant to *A. euteiches*.

Ascochyta

As in previous years, Mycosphaerella blight was the most widespread foliar disease, observed in all surveyed fields in 2017.[1] Part of the Ascochyta complex, the host range is limited to peas and the primary source of inoculum is crop residue. Seed can be a minor source of inoculum and seed treatment should be used if >10% of the seed source is infected with Ascochyta.[5] Crop rotation can reduce disease pressure, but spores travel long distances by wind. Thus, crop rotation, in addition to foliar fungicide application, is often necessary to effectively control this disease. Other foliar diseases that infect common annual crops, such as Sclerotinia and downy mildew, were infrequently observed in the 2017 pea disease survey and are generally not economically important.[1]

References
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Field Pea Fertility Recommendations

Field peas can, on average, fix 55% of their nitrogen (N) requirement through a symbiotic relationship with *Rhizobium leguminosarum*. This bacteria is native to Prairie soils, yet farmers typically inoculate peas.


Field pea roots with nodules.

Is inoculation necessary for peas?

In field studies conducted on land with no history of peas in Alberta, peas responded to inoculant 45% of the time.[1] The magnitude of yield response to inoculant in these studies was, on average, 14% higher than the uninoculated control. In contrast, in fields with a history of peas, 38% responded to inoculant but the magnitude of yield response was much lower (5%).[1] With recommendations to increase the break period between pea crops and the uncertainty of levels and efficiency of native rhizobia populations, supplementary inoculant is a cost-effective means of ensuring maximum yield.

Inoculant Formulation

The most effective inoculant formulation to increase nodule number, N_2 fixation and seed yield is soil-applied granular > seed-applied powder > seed-applied liquid inoculant (Figure 6).[2,3] Peat and granular formulations may provide some protection to the rhizobia against environmental stress such as desiccation compared to liquid formulations.

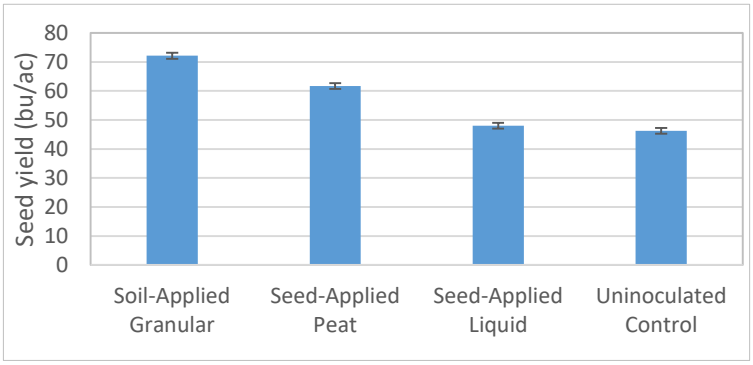

Figure 6. Effect of inoculant formulation on pea yield, averaged over all N-fertilizer rates and six site years. Soil-applied inoculant resulted in 17, 50 and 56% higher pea yield than peat, liquid or the uninoculated check.[3]

Fertilizer Needs

Although peas will take up a portion of their required N from soil reserves, proper inoculation generally eliminates the need for starter N fertilizer. McKenzie et al. (2001) found that 33% of trial sites with <20 kg N/ha in the top 12 inches of soil responded to starter N and pea yields increased by an average of only 11%.[1] High rates of urea (35-71 lbs N/ac) applied at seeding can reduce nodule number and N_2 fixation.[2] Starter phosphorus (P) fertilizer has been shown to increase pea yields even on high P soils.[4] Maximum seed-row safe rates are 20 lbs P_2O_5/ac with seed bed utilization (SBU) >15%. P fertilizer should be placed away from the seed-row with lower SBU.

References
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Call For Farmers to Participate: Test Soybean Response to Potash

Potassium (K) deficiency symptoms are appearing more commonly in Manitoba, particularly on loamy soils along the escarpment, or on fields with a long, frequent history of soybeans. Soybeans remove more K than any other annual crop (1.1-1.4 lbs K_2O/bu exported at harvest).

Dr. Don Flaten and graduate student Megan Bourns are currently investigating soybean response to rates and placements of potash across a range of soil test K levels in Manitoba. In collaboration with the U of M, MPSG is investigating soybean response to potash fertilizer with on-farm trials to determine the critical soil test K level across a broader range of soil types. The On-Farm Network empowers farmers to test research findings, helping guide and inform management decisions.

Join the On-Farm Network to participate in this study! Sign up online or contact MPSG On-Farm Specialist, Greg Bartley (204-751-0219). We are still looking for fields that have low soil test K (<150ppm). Potash fertilizer will be provided and can be broadcast or banded, depending on your available equipment. Refer to the protocol for more information on how the trial will be conducted.

THE SCOUTING NETWORK

The Scouting Network is a representative sample of pulse and soybean fields across Manitoba observed by MPSG agronomists. Fields included in the Scouting Network may also be selected for annual pulse and soybean disease surveys. Information acquired through the Scouting Network enables MPSG to provide farmers with independent, up-to-date production information, supporting The Bean Report. Sign up your pulse or soybean field today at www.manitobapulse.ca!