The Bean Report

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MANITOBA Pulse Soybean GROWERS

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Faba beans developing pods in western Manitoba (10-20% of pods at full length).

Soybeans

Soybean crops in Manitoba currently range from the R2 (full bloom) to early R4 (full pod) stages, sitting mainly at R3 (beginning pod). The R3 stage signals the first timing of the season for our annual soybean disease survey efforts. The goal of this first visit is to note the presence of any foliar, stem and root diseases in soybeans, rate the severity of foliar disease symptoms and collect root samples for lab confirmation of root diseases. Are you seeing soybean plants that are yellowing only in the lower canopy? This may be a sign of natural senescence accelerated by dry conditions. If you are concerned that these may be disease symptoms, refer to Bean Report #6 for foliar diseases and page 3 of this report for stem and root diseases. Also watch for nutrient deficiencies in soybean crops at this time, such as nitrogen (general plant yellowing) and potassium deficiency (yellow halo around the leaf edges). See page 2 for more information on these deficiencies in Manitoba.

No soybean aphids have been reported in Manitoba yet. However, low numbers are present in the southeast corner of North Dakota. As soybean aphids blow in on winds from the south, check your crops on a weekly basis to detect their arrival. Note that warm, dry conditions are conducive to aphid reproduction. **New from MPSG!** Soybean Aphids: Identification, Scouting and Management is a brand new fact sheet developed by Manitoba Agriculture entomologist, John Gavloski and MPSG. Refer to this resource for Manitoba-specific information on soybean aphids and a compilation of the most relevant research-based information.

Dry Beans

Dry bean crops are developing quickly with plants at the R2 (beginning pod) to R3 (50% bloom) stages. Beans at R3 will have 1-inch long pods at the first flower position. Vine-type edible beans are extending vines that knit together across rows. At this time, most beans are likely outside the optimum fungicide application window. Assess fungicide efficacy by searching for symptoms of white mould. If you are questioning your risk of white mould development, note that sclerotia needs at least 10 days of moist soil conditions to release spores.

Black beans in southwest MB at R2 on July 12 (left) and pinto beans in south-central MB at R3 on July 13 (right) with lower pods elongating.

Field Peas

Field peas are currently at the full pod stage and seeds are starting to fill the lower pods. Dry conditions in may be contributing to senescence in the lower canopy. Assess peas for fungicide efficacy for future management decisions. Low levels of pea aphids were observed this year. At this advanced crop stage, damage caused by pea aphids is no longer economical.

Peas at the full pod stage on July 12, 2018.

Faba Beans

Faba bean crops are rapidly gaining height and pods, at approximately 10-30% of full pod length. Scout for fungicide efficacy, by looking for diseases such as chocolate spot and Ascochyta blight. Also scout for insects, such bertha armyworms and grasshoppers.

***Save the Date!* MPSG Pulse Tour • August 22, 2018 at 10:00 a.m. • AAFC Morden Research and Development Centre**

Highlighting an investment of $780,000 toward dry bean development for Manitoba

Potassium Deficiency in Soybeans

Figure 1. Potassium deficiency symptoms at a research site near Bagot, MB in 2018. Symptoms first observed at V2.
Photo: Megan Bourns, U of M.

Most Manitoba soils have potassium (K) levels above the critical soil test range of 50-75ppm for soybeans, wheat and canola, according to the Manitoba Soil Fertility Guide. However, soybeans remove K at much higher rates than other crops—1.4 lbs K_20/bu, which is 3x greater than wheat or canola! With the increased acreage and frequency of soybean in rotations, K deficiency is beginning to emerge, particularly on our coarse-textured soils with inherently low K. Potassium deficiency may also be more prevalent on land that has been used for hay production. Areas within a field with high aphid populations can also be an indicator of K-deficient soils.

During soybean vegetative stages, K deficiency symptoms appear in the lower canopy as yellowing and necrosis of the leaf margins. Symptoms are more likely to appear during reproductive stages when rapid uptake of K occurs. Late season K deficiency appears in the upper canopy as K is remobilized to the seed. These deficiency symptoms can easily be confused with iron deficiency chlorosis, which is more predominant in early vegetative stages and in the upper canopy. If potassium deficiency is suspected, confirm it with a soil and tissue sample. Addition of fertilizer or manure at a rate greater than K removal will slowly build up K levels and is good practice to ensure adequate amounts for heavy users of K, such as corn or potatoes.

Ongoing small-plot and on-farm research led by the University of Manitoba and MPSG is currently evaluating the frequency of soybean yield response to potash applied at various rates and placements, across a range of low-testing K soils in Manitoba. Stay tuned for more results from the 2018 growing season.

Rescue Nitrogen Fertilizer for Poorly-Nodulated Soybeans

Nodulation failure and nitrogen (N) deficiency has appeared in soybeans across Manitoba, particularly on fields without a history of soybean, in high residue production systems and on acidic soils (pH <6.0). A possible explanation for poorer than usual nodulation and/or nitrogen fixation could be the dry seeding and growing conditions encountered this spring and early summer. Drought conditions can limit N-fixation and cause desiccation of more vulnerable inoculant formulations (e.g. liquid compared to granular).

Impact on Yield

Over the course of the growing season, a 40 bu/ac soybean crop will need 180-230 lbs N/ac. Soybeans can biologically fix 40-60% of their N requirement, acquiring the remainder from soil reserves. On fields without a history of soybean production, research in Manitoba found uninoculated soybeans had an average yield loss of 15 bu/ac and reduction of 4.8% compared to all inoculated treatments (MPSG 2018).

Management Options

Without adequate nodulation (<10 nodules/plant), farmers should consider a rescue N fertilizer application to ensure an adequate supply to the crop through pod filling (R4). This is when peak N uptake occurs (Figure 2). A general recommendation is to apply rescue N fertilizer at 50 lbs N/ac at the R3 (early pod) growth stage. Direct fertilizer below the canopy to eliminate leaf burn, which can reduce yields. This recommendation is applicable if soil N reserves have adequately supplied the crop with N up to the flowering stage (Heard 2013). Recent research in Saskatchewan found that 50 lbs N/ac as UAN applied at R2-R3 increased yield of soybeans (at 4 of 9 site years) that received only liquid inoculant on fields with a limited soybean history. Unresponsive sites were extremely dry and had high residual soil N (IHARF 2017a). Even in dry conditions such as those encountered in 2017, a rescue N application increased soybean yield by 36% compared to an uninoculated control, and by 13% compared to the liquid-inoculated control (Table 1) (IHARF 2017b). However, rescue N fertilizer application never resulted in yields greater than those of well-nodulated soybeans treated with granular inoculant.

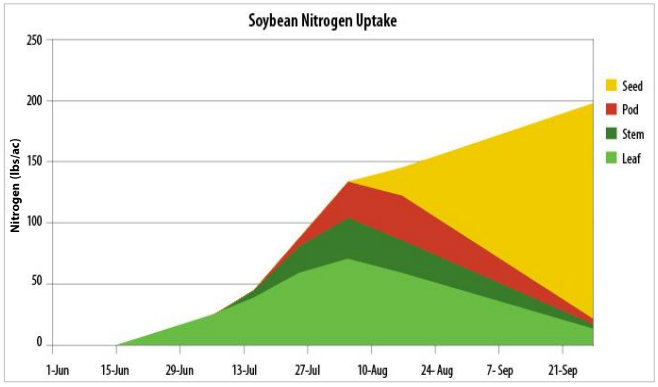


Figure 2. Soybean nitrogen uptake and partitioning during the growing season.

Table 1. Select treatments from soybean inoculant and rescue nitrogen fertilizer trial at Indian Head, SK in 2017. Note: Soybeans were direct seeded into barley stubble on May 18.

Inoculant †	UAN @ R3 ‡	Yield (bu/ac)
None	None	11.9^{f}
None	50 lbs N/ac	16.2^{de}
1x rate liquid Cell Tech	None	15.0^{e}
1x rate liquid Cell Tech	50 lbs N/ac	17.1^{cd}
1x rate granular Cell Tech	None	18.5^{abc}
1x rate liquid + 1x rate granular Cell Tech	None	17.9^{bcd}

† Liquid inoculant was applied on seed and granular inoculant was applied in-furrow.
‡ Rescue UAN was applied on July 24. Residual soil N in 0-24" was 14 lbs N/ac.

In Ontario, where soil organic matter levels and residual N levels are low, the recommendation is to apply a rescue fertilizer earlier—at R1 (early flower) if soybeans are pale green and stunted (OMAFRA 2017). If soil N reserves are low, higher rates of rescue N fertilizer (100 lbs N/ac) may also be required to maximize yields (NDSU 2015).

Soybean Stem and Root Diseases

Stem and root diseases can have a greater impact on soybean yield and quality than foliar diseases. Symptoms typically arrive later in the growing season during reproductive stages, which can directly impact pod and seed production. The most prevalent and economically important diseases in this category are white mould (Sclerotinia) and Phytophthora root rot. For more information and images of all diseases, visit the Crop Protection Network.

White Mould

White mould can cause 2-5 bu/ac of yield loss for every 10% increase in incidence (% of plants affected). Cool, wet conditions throughout July and August and a dense crop canopy favour disease development. Infection begins low in the canopy at nodes along the stem. Symptoms may first be noticed from afar as lodged plants or wilted, drying leaves at the top of the canopy (Figure 3A). Inside the canopy, symptoms may appear as white mycelium (mouldy growth) along the stem with black sclerotia bodies inside the stem (Figure 3A).

Phytophthora Root Rot

Phytophthora root rot (PRR) is considered both a root and stem disease. In 2017, it was detected in 35% of surveyed soybean fields in Manitoba. This disease can affect plants at all stages, but it is easier to identify at reproductive stages when a distinct brown lesion girdles the stem. PRR progresses from the base of the plant upwards and wilted leaves remain attached to the plant. Foliar fungicide will not salvage infected plant tissue.

Pod and Stem Blight

Pod and stem blight is present in Manitoba, but at low levels. It is identified by distinct lines of raised, black dots (pycnidia) on infected stems, pods (Figure 3B) and petioles. Seed infection (Phomopsis seed decay) only occurs if pods are affected, reducing seed quality. Symptoms may be easier to detect in August through September.

Anthracnose

Anthracnose is less common in Manitoba-grown soybeans. It appears as reddish-brown irregularly-shaped blotches on the leaves, stems (Figure 3C) and petioles. Black fungal bodies develop in these blotches later in the season. Leaf symptoms include reddish veins and petioles may become twisted and bent into a Shepherd's crook, resulting in early defoliation.

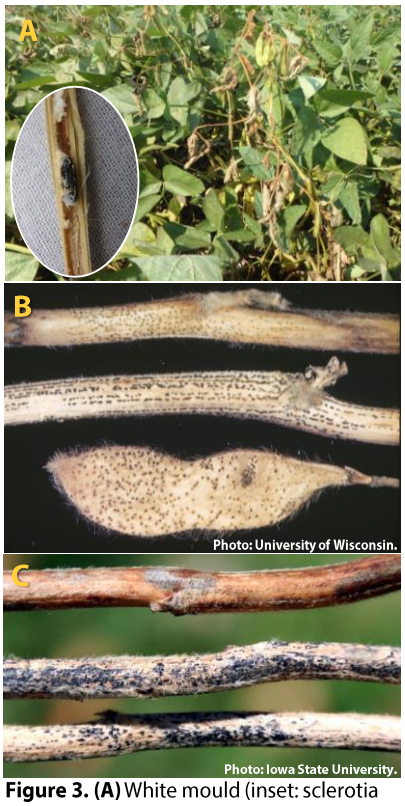
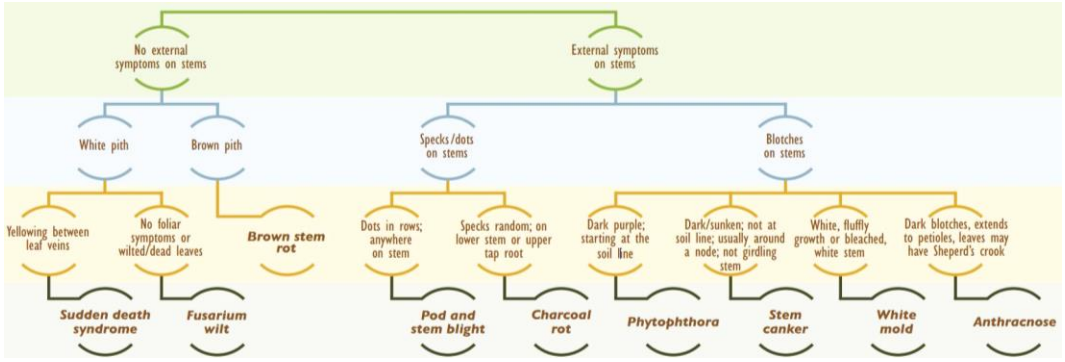


Figure 3. (A) White mould (inset: sclerotia body inside of the stem), **(B)** pod and stem blight and **(C)** Anthracnose.

New Potential Threats

Below is a list of diseases that are not yet confirmed in Manitoba. However, early detection and preventative management can slow the spread of these pests. If you suspect one of these diseases in your crop, geo-reference the location and contact MPSG Production Specialists Cassandra or Laryssa to facilitate lab verification. Note that foliar fungicides will not offer control of these pests.



Soybean stem disease symptom key. Source: Crop Protection Network - Scouting for Soybean Stem Diseases.

Charcoal Rot

Charcoal rot appears as a light-grey or silver-coloured lower stem and taproot. When stems are split, black streaks will be present in the woody portion of the stem. This disease also produces tiny, black fungal structures (microsclerotia) throughout affected areas of the plant, giving the tissue a charcoal-like appearance.

Soybean Cyst Nematode

Soybean cyst nematode (SCN) is an inconspicuous pest that may first be identified by a steady yield decline over time. Once foliar symptoms of SCN appear in the field (yellowing and stunting) soybeans could already be losing >30% of yield. Scout for SCN during July and August by carefully digging up roots and inspecting them for cysts. The tiny, lemon-shaped cysts are much smaller than root nodules and may require a magnifying lens for identification. Look for SCN in high-risk areas of the field such as field entrances, depressions and headlands. Fields located near the Canada-United States border are also at greater risk.

Sudden Death Syndrome

Sudden death syndrome (SDS) infects roots early in the growing season, but foliar symptoms usually appear after flowering. Interveinal leaf chlorosis becomes necrotic, then leaves eventually die and prematurely fall from the plant leaving the petiole attached. Fields infested with SCN can increase the severity of SDS symptoms.