The Bean Report

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MANITOBA Pulse Soybean GROWERS

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Reducing Soybean Harvest Losses

Soybean Maturity Guide

Dry Bean Growth Staging Guide

Harvest is in full swing for MPSG On-Farm Network participants.

Soybeans

Soybean harvest began last week near Roland, Rhineland and Arnaud. Recent rainfall was likely too late to make a positive impact on soybean yield, as crop stages range from R7 to R8 in most areas of the province. Soybeans are most sensitive to drought during the earlier, pod filling stages. Variable rates of maturity within and among fields may make harvest timing a challenge. Soybeans are ready to harvest at <14% moisture or approximately 5-10 days after most of the crop reaches R8. This is when all leaves have dropped, the field appears tan-brown and seeds rattle in the pods.

Soybean maturity varying with soil moisture differences in a field near Carman on August 24.

Dry Beans

Dry bean harvest is well underway across Manitoba. Fields yet to be harvested are rapidly approaching maturity and crop staging is mainly between R8.5 and R9. Very dry seed has been reported as a harvest issue. Refer to NDSU's Dry Bean Production Guide - Harvesting Dry Beans for combine setting tips. Patchy maturity also poses challenges for desiccation timing. If a large portion of the field is not at full maturity, consider desiccating and/or harvesting only ripe patches. Wait for other areas to mature a bit more. Applying desiccant at earlier-than-recommended growth stages can result in harvested seed exceeding maximum residue limits (keepingitclean.ca).

Mature dry beans in the wide row variety trial south of Carman.

Bacterial blight (left) and anthracnose (right) lesions on dry beans on August 20.

Field Peas

Pea harvest is now complete in all areas of the province. Yields were very good this year, averaging around 60-70 bu/ac. Dry early- and mid-growing season conditions limited the development of root rots such as Fusarium spp. and *Aphanomyces euteiches*, which thrive in moist to saturated soils. Despite low prevalence in 2018, pea growers should be aware that Aphanomyces produce very long-lived resting spores in the soil. These spores will germinate when ideal soil conditions (warm, saturated) appear again in future years. Prospective fields destined for field peas in 2019 can be soil tested this fall to determine the presence or absence of Aphanomyces.

This year's early harvest and recent rainfall offers an opportunity to seed "shoulder season" cover crops this fall. To choose a cover crop species for your scenario, see Selecting the Best chapter from SARE.

Faba Beans

Faba bean harvest has commenced in the eastern half of the province, where disease pressure was high, while crops in western Manitoba continue to mature.

Faba beans seeds and pods drying from the base of the plant upwards on August 23.

Residue Management for Moisture Conservation

With the exception of the northwest region, moisture limitations have been the norm in 2018 across Manitoba. Most regions received <200 mm over the growing season (map of accumulated precipitation). Ground water levels are also trending lower than normal in some areas (aquifer levels here). We may be entering a new dry cycle, meaning we need to revisit strategies to conserve soil moisture. Drier conditions also give us the opportunity to reduce or eliminate tillage in part of the crop rotation in conventional-till systems!

Any type of tillage results in higher evaporative water loss compared to untilled soil (Figure 1). Each cultivator pass in the spring can remove approximately 10-12 mm of water from the soil. Research conducted in Manitoba in the early 1980s showed that zero-till conserved moisture early in the growing season and increased crop water use efficiency by decreasing evaporation and surface runoff and by increasing infiltration and the amount of trapped snow.

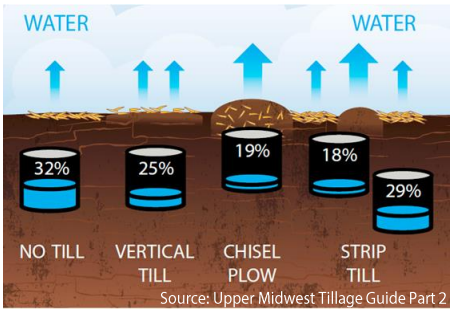


Figure 1. Average soil moisture levels taken from thaw to canopy closure to 2" depth on four tillage systems in North Dakota and Minnesota.

Management Ahead of Soybeans and Pulses

On heavy clay at Indian Head, SK, zero-till increased field pea yield by 10%, flax by 23%, and spring wheat by 21% compared to conventional-till from 1987 to 1990, when growing season precipitation was 164-233 mm. During that period, researchers in Manitoba found that the performance of wheat, canola and peas grown on cereal stubble did not differ between conventional till (residue cover 20-42%) and zero-till (residue cover 62-88%) at Portage la Prairie (clay loam) and Carman (very fine sand), where growing season precipitation ranged from 91-242 mm. With crop productivity proving equal or better under zero-till than conventional-till systems, zero-till has been widely adopted across the Prairies where moisture deficits are typical.

Unfortunately, incorporating soybeans into crop rotations has resulted in re-introduction of tillage for long-time zero-tillers. Incorporating residue increases soil temperature, which in turn can increase emergence rates. Recently completed research in Manitoba, however, demonstrated no difference in soybean yield between tilled wheat stubble and zero-till wheat, oat and canola stubble when soybeans were planted within May 17-26 and soil temperature (>10°C) (see full report here).

Management after soybeans and pulses

Introducing zero-tillage may seem like a radical practice in the eastern half of the province. Though it may have been unpractical with cereal-oilseed rotations, the introduction of low-residue crops like soybeans, peas and dry beans into rotations makes experimenting with conservation tillage less risky. Recent on-farm research conducted in Manitoba found that seeding corn and wheat into zero-till soybean stubble had no effect on yield (Table 1). At a 2-inch depth, no difference in soil moisture or temperature was observed across any tillage treatment at any site during the emergence period the following spring. Even when soybean residue is left on the soil surface without incorporation, soybean residue broke down and ground cover was reduced by 31-57% from fall to spring (see full report here).

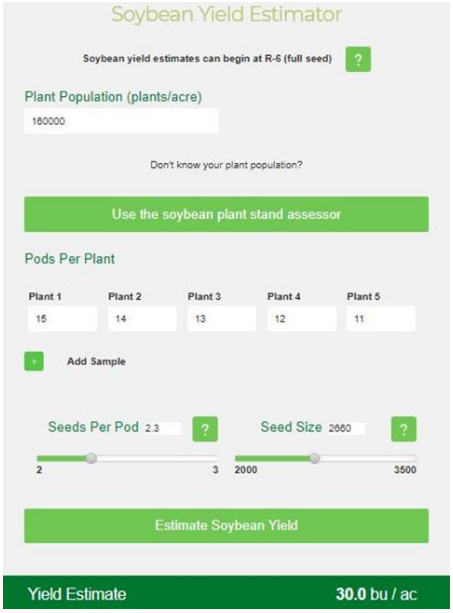
Soil loss from a soybean field May 15, 2018. Eliminating tillage of low residue pulse or soybean crops may reduce wind erosion the following spring.

Table 1. Yield (bu/ac) from five on-farm trials comparing fall soybean residue management strategies in Manitoba. Research conducted by Dr. Yvonne Lawley, in partnership with MPSG.

	Boissevain 2015 (Wheat)	Winkler 2015 (Corn)	Homewood 2016 (Corn)	Linden 2017 (Soybean)	New Bothwell 2017 (Wheat)
Disc or Cultivator	69.1	132.6	177.0	29.1	83.3
Vertical Tillage – High Disturbance	66.9	133.1	-	-	-
Vertical Tillage – Low Disturbance	69.3	134.0	169.8	-	-
Zero-Tillage (Direct Seeding)	68.0	131.7	167.8	26.2	85.1
Significant Difference	No	No	No	Yes	No

Soybean Yield Estimates

Are you curious what your soybean yield might be in 2018, but your crop isn't harvested yet? Gain insight into storage needs and budgeting decisions by using the MPSG Bean App Soybean Yield Estimator available in the App Store and Google Play. This free, easy-to-use app tool allows you to enter the plant population, number of pods per plant, seeds per pod and estimate seed size to calculate expected yield. Estimates of yield can begin at R6 (full seed) in any given year. Just remember that yield tends to vary across a field. Methods to improve the accuracy of estimates include collecting samples from different areas of the field and increasing the number of samples.



Preliminary Results from the 2018 Disease Surveys

Since 2014, an annual soybean disease survey has been conducted by Manitoba Agriculture and Manitoba Pulse & Soybean Growers. Each year, this survey provides insight on the presence, incidence and severity of soybean diseases. The focus of this survey has traditionally been on foliar diseases. However, the survey has been adapted each year to suit the needs of farmers and aid other MPSG-funded research projects focused on soybean diseases.

In 2018, two surveys were carried out at the R3 (beginning pod) and R6 (full seed) stages. Root samples were collected at R3 for AAFC root disease research conducted by Dr. Deb McLaren and Dr. Bob Conner at AAFC. This work aims to continue the identification of predominant Phytopthora root rot (PRR) races in Manitoba. Knowing which PRR races pose the biggest threat to our soybean crops will aid variety and resistance gene selection decisions faced by farmers. The information is then made available in the MPSG Pulse and Soybean Variety Guide and Seed Manitoba.

Data from the 2018 survey is still being analyzed, but it appeared that root disease pressure was low overall across the province. This may be due to dry soil conditions. Foliar diseases present in this year's survey were the usual suspects, including bacterial blight, Septoria brown spot, downy mildew and frogeye leafspot. Contrary to previous years, there appeared to be greater incidence of brown spot than bacterial blight. Although present in most years, these foliar diseases are often not yield-limiting. Low levels of stem and root diseases were present, including PRR, anthracnose, stem canker and Phomopsis/pod and stem blight. Current levels suggest that their impact on yield is still low for Manitoba, but stem and root diseases pose a greater threat to yield than foliar diseases. It should be noted that the odd case of widespread and severe PRR has been reported, even under the dry conditions of 2017 and 2018. Due to this, it is recommended to assess fields individually for disease pressure and ensure that crop rotations are wide enough to prevent increases in pest pressure.

2018 Disease Survey Updates from AAFC

Soybeans

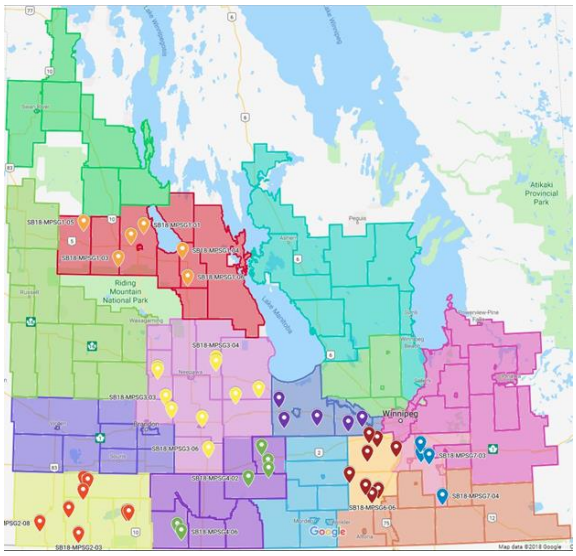
- 95 fields surveyed for root diseases
- 30 roots collected per field, 15 of these saved for molecular detection of root rot pathogens, e.g., Fusarium, Rhizoctonia and *Phytopthora sojae* (22 isolates of *P. sojae* thus far, to be confirmed by DNA sequencing)
- Soil samples collected from 40 fields for molecular detection of *P. sojae* through a separate CAP project led by Dr. Richard Belanger

Dry Beans

- 40 fields surveyed for root diseases
- 30 roots collected per field, 15 of these saved for molecular detection of root pathogens

Field Peas

- 45 fields surveyed for root diseases following the same protocols as above
- 50 plants additional plants and 10 soil samples collected per field to be analyzed for *Aphanomyces euteiches*, in collaboration with Dr. Syama Chatterton



Soybean fields surveyed for disease by MPSG staff. A total of 95 fields were surveyed in 2018 by MPSG, Manitoba Agriculture and University of Manitoba staff, covering all highlighted regions on the map.

Pulse Breeding and Pathology Tour Re-Cap

MPSG has committed to an investment in the next generation of dry bean variety improvement, on behalf of dry bean growers. On Wednesday, August 22nd, MPSG co-hosted a tour with the AAFC Morden Research and Development Centre showcasing pulse breeding research led by Dr. Anfu Hou and pathology research led by Dr. Bob Conner. About 30 people were in attendance, including farmers, industry and members of the research community.

The bean breeding program has accelerated crossing and selection of materials over the past five years. This work provides a direct benefit to farmers in the form of improved dry bean varieties. Dr. Hou walked us through his recent efforts including Adzuki bean adaptation and agronomy in Manitoba, and development of a high-yielding cranberry bean, AAC Scotty, with resistance to anthracnose races 73 and 105.

Dr. Conner explained the advances being made in dry bean disease resistance. Important diseases such as white mould, common bacterial blight and anthracnose are now better understood, and the genetic sources of resistance are being added to the various market classes. Seed quality factors, such as marsh spot, are also under investigation.

Dr. Hou and adzuki bean variety selection plots (left) and Dr. Conner demonstrating anthracnose resistance research (right).