The Bean Report

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MANITOBA Pulse & Soybean GROWERS

This week….

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Figure 1. Soybeans planted May 12 (L) and May 1 (R) show radicle growth below ground as of May 19. Cold soil temperatures have kept soybeans underground for 3 weeks.

Seeding progress update

Across the province, approximately 20-25% of soybean acres have been planted. The majority of these acres were in the eastern region in early May despite cool soil temperatures. **Dry bean planting** is yet to fully get underway in Manitoba and was 2% complete in North Dakota as of May 10.

Historically, soybean seeding progress to the third week of May has been 68% (source: MASC 2008-2012). We are behind normal but there is still plenty of time to plant soybeans as yield potential will hold until the end of May.

Soybeans planted April 27-May 2 are showing radicle growth of 2" (Figure 1) but no emergence has been observed. This was good for protection from frost but the prolonged emergence period increases susceptibility to insects and disease as seed treatment wears off. Seed decay and reduced emergence in wet soil conditions is also a concern.

Table 1. Days to emergence for soybeans

Soil Temp.	Days to emergence
<10°C	3-4 weeks
10-12°C	2 weeks
>12°C	7-10 days (Optimum)

Soybean planting resumes this week in the northwest region, where the lowest rainfall amounts were received from May 11 to 18. The rule of thumb is to begin soybean planting when soil temperature at the desired seeding depth (0.75-1.5") reaches 10°C at 10am. Soil temperatures are expected to climb rapidly in the next few days and given the calendar date, planting will resume as soon as field conditions allow in all areas.

Cool and wet describes spring weather so far (Table 2). Generally, **soybeans require 150 GDD to reach 90% emergence,** which has not been reached.

Table 2. Rainfall and Growing Degree Days (GDD) May 1 to 18

	Total Rainfall (mm)	% Normal Rainfall	Accumulated GDD	% Normal GDD
Dugald	80	289	75	76
Carman	91	325	72	67
Altona	110	351	83	71
Morris	90	309	82	77
Portage	73	291	82	78
Dauphin	33	111	73	82
Melita	111	358	72	65
Brandon	47	150	61	67
Woodlands	68	271	72	69

Yield potential of soybeans planted in late May in Manitoba

Long-term crop insurance data indicates that the yield potential for soybeans generally holds at 100% in Manitoba until the last week of May. At this point, yield potential may decline to 85-95% for central and eastern Manitoba (**Table 3**). That being said, on-farm seeding date studies at Carman have shown soybean yield to remain within 1-2 bushels of the highest yield when planted up until the end of May.

Throughout May, farmers should continue with soybean seeding plans. If planting is delayed to June, consideration should be given to increased seeding rates and narrower rows in order to reach canopy closure and increase plant height.

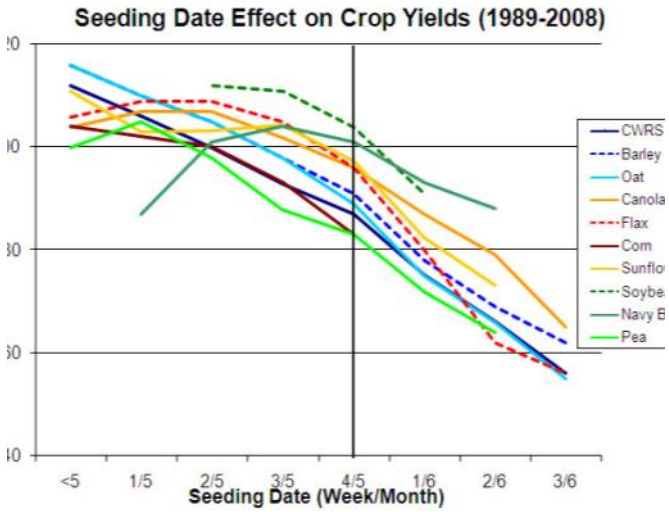

Figure 2. Crop yield (% of average) based on week of planting from 1989 to 2008 based on MASC data.

Table 3. Relative yield (% average) and # of acres planted by seeding month/week in selected risk areas of Manitoba (MASC: 2008-2012)

	12 RR Valley		32 RRV (Clay soil)		14 Eastern		11 Portage		5 Central		2 Southwest		9 Dauphin	
M.W	% Yield	Acres	% Yield	Acres	% Yield	Acres	% Yield	Acres	% Yield	Acres	% Yield	Acres	% Yield	Acres
4.4	103	485	122	4,471	134	989	87	83	3	50	9	90	0	-
5.1	96	1,447	111	5,348	118	1,197	91	229	120	315	0	-	91	157
5.2	109	14,788	97	66,354	113	13,183	108	4,771	89	1,415	110	371	73	600
5.3	101	27,180	101	135,870	100	35,270	102	15,719	103	5,700	102	2,718	100	1,747
5.4	88	8,021	85	60,557	85	24,054	80	10,165	95	3,744	102	1,400	100	3,406
6.1	90	11,427	88	30,788	80	2,590	81	1,380	85	836	60	102	84	845

Potential concerns for early-seeded soybeans

1. **Flooding:** Seed germination and seedling weight can be reduced significantly by prolonged periods of flooding. Research in controlled conditions has shown that flooding for 48h beginning 3 days after the start of water uptake reduced germination by over 40% compared to a reduction of 20-30% when flooding occurred for 12-24h.
2. **Soil crusting:** The recent rains may lead to soil crusting which could inhibit soybean emergence. It is possible to perform a light harrow operation to break the crust for soybeans that are still underground.
3. **Seed and root rots:** cool, wet soils favor seed and seedling diseases. This will be particularly important in water-logged fields with a frequent history of soybean. Seed treatments provide protection for 2-3 weeks and this protection begins at seeding, not emergence. For a detailed description of early season root rot pathogens, see **page 4**.
4. **Reduced plant stands**: The factors listed above (flooding, fungal pathogens) can lead to reduced emergence and plant stands. It will be important to assess the plant stand and yield potential in each field. Soybeans compensate remarkably well for lower plant stands and re-seeding is generally not required. For example, even at 80,000 plants/ac, 84% of optimum yield is expected (Figure 3) and re-seeding is rarely profitable. With reduced plant stands, timely weed

control and lower pod height should be kept in mind.

5. **Frost damage:** Soybeans that have not emerged are protected from freezing temperatures but *emerged* soybeans are at risk to frost damage because the growing point is above ground. At the cotyledon stage, they are fairly tolerant to –2°C for a short period of time. Once true leaves emerge, they are more susceptible. Always wait 3-5 days after a frost event to assess damage. For soybeans, even if the main growing point is lost, re-growth generally will occur from axillary buds (**Figure 3**). More information on assessing frost damage to crops is available here.
6. **Herbicide injury:** Wet soil may increase activity of some soil applied herbicides, leading to crop injury.

Figure 3. Despite death of the main growing point, growth can resume from 2 axillary buds in soybean located at the base of the cotyledons

To determine your seeding rate for soybean, you must first identify your target plant stand

From 2011-2013, a range of soybean seeding rates from 80-200,000 seeds/ac were tested at 8 locations across Manitoba in both a wide and narrow row system. **Figure 4** illustrates the final results from this study where the actual plant stand (live plants/ac) was plotted against relative yield. This relationship accounted for nearly 70% of the variability observed in yield data.

The quadratic relationship reveals important information on what soybean plant stand we should be targeting:

1. The maximum yield is achieved at an established plant stand of 160,000 plants/ac
2. Plant stands higher than 160,000 plants/ac do not result in increased yield
3. Actual plant stands of 80K, 120K and 140K produced 84, 95 and 98% of optimum yield.

Here at MPSG, we combined this data with soybean price, cost of seed and expected yield to determine the economically optimum plant stand. For 2015, the target plant stand that will deliver the highest return has been identified as 140,000 plants/ac. But remember….

Target plant stand ≠ Seeding rate

From your target plant stand, you determine your seeding rate based on "expected seed survival". In other words, how many seeds should you plant to ensure you reach your target? Expected seed survival takes accounts

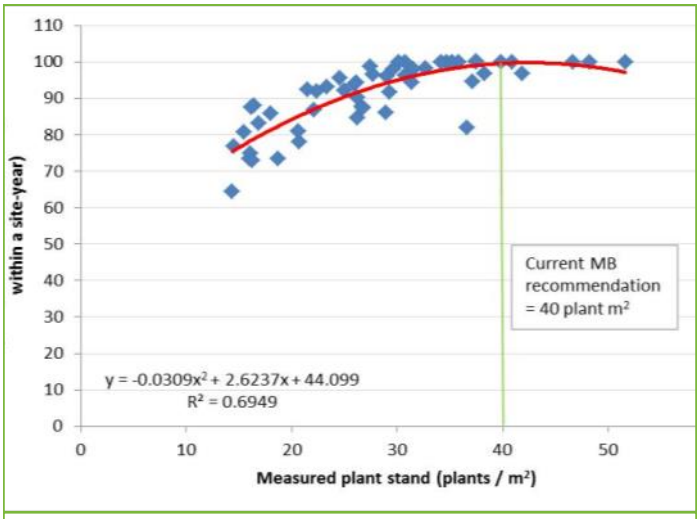

Figure 4. Relative soybean yield (% of average) based on measured plant stand (plants/m^2) from results of Mohr et al. 2014

for % germination and other factors affecting emergence:

- Seed quality
- Equipment and handling
- Seedbed conditions
- Pest pressure

Suggested Seeding Rates for Soybeans

Air seeders: 190-210,000 seeds/ac
(based on expected seed survival of 70-75%)
Planters: 170-180,000 seeds/ac
(based on expected seed survival of 80-85%)

Early season seed and root rot pathogens of soybean

	STAGE AFFECTED						
PATHOGEN	Seed rot (Pre-emerge)	Seedling mortality (V-E to V-4)	Root/stem decay (V-E to R-6)	**OPTIMAL ENVIRONMENT**	**ALTERNATE HOSTS**	**SYMPTOMS**	**MANAGEMENT**
Pythium spp.	●	●		Cold (10-15°C), wet soil	Wide host range including pulses, cereals, canola, alfalfa	Water-soaked lesions on hypocotyl or cotyledons. Diseased plants easily pulled from soil because of rotted roots.	Fungicide seed treatment
Rhizoctonia solani		●	●	Warm (20-27°C), moist to wet soil	Wide host range including pulses, cereals, canola, alfalfa	Reddish-brown lesions on the hypocotyl at the soil line, or on root extending upwards. Lesion remains firm and dry.	Fungicide seed treatment
Fusarium spp.		●	●	Warm (20-27°C), dry to moist soil	Wide host range including pulses, cereals, canola, alfalfa	Brown vascular tissue in roots and overall discolored roots. No external decay visible above the soil line. Compromised root system results in wilting and leaf death.	• Fungicide seed treatment • Partial resistance
Phytophthora sojae	●	●	●	Warm (20-27°C), wet soil	None	The most economically important as it affects soybeans at all stages. Water-soaked stems on seedlings or dark brown lesions on lower stem.	• Crop rotation • Resistance • Seed treatment

Consider using a pre-plant or pre-emerge herbicide for soybeans and dry beans in Manitoba

PRE herbicides are a good foundation for dry bean weed control and will help slow or prevent the development of glyphosate resistant weeds in Roundup Ready soybeans. Glyphosate resistant kochia was confirmed last year in two Manitoba fields and giant ragweed, common ragweed or wild oat could be next. Glyphosate resistant ragweed is present in North Dakota and wild oat is predicted by Canadian weed scientists. Richard Zollinger from North Dakota states that pre-applied soil herbicides are predicted to be used on less than 10% of acres in North Dakota (likely similar or less in Manitoba) and provides several reasons for growers to consider using one:

1. Reduce early-season weed competition and provide residual control, protecting yield.
2. Lengthen the time before the first post-emerge herbicide application is required. [This provides flexibility if post-emerge applications are weather delayed].
3. Provides an alternative mode of action and reduces the number of plants present at the time of the in-crop application, reducing the likelihood of selecting for herbicide-resistant biotypes.
4. Reduce the size of weeds present at the time of the post-emerge herbicide application [thereby increasing efficacy].

Table 4. PRE herbicide options for soybeans and dry beans (pinto and navy) and their efficacy of selected weeds.

Always refer to Guide to Field Crop Protection or label for further information on rates, effects of growing conditions etc.

Product	Group	Timing	Soybean	Pinto, Navy †	Barnyard grass	Foxtail, Green	Volunteer cereals	Quackgrass	Buckwheat, Wild	Dandelion	Catchfly, Night-flowering	Kochia	Lambsquarters	Mustard, Wild	Nightshade, Hairy & Eastern Black	Pigweed, Redroot	Ragweed, Common	Stinkweed	Thistle, Canada	Volunteer Canola
Amitrol	11	Pre-emerge	●	●					●											
Authority/Authority Charge	14	Pre-plant/pre-emerge	●						●			●	●			●				
Dual II Magnum	15	Pre-plant incorporated	●	●	●	●									●§					
Edge Granular	3	Pre-plant incorporated	●	●	●	●	●		●			●	●			●				
Eptam	8	Pre-plant incorporated		●	●	●	●						●			●				
Flexstar‡	9 + 14	Pre-plant/Pre-emerge	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Flumioxazin (Valtera)	14	Pre-plant/pre-emerge	●			●				●			●		●	●	●			
Focus	14 + 15	Pre-plant/pre-emerge	●		●	●							●		●	●				●
Frontier Max	15	Pre-emerge		●		●														
Glyphosate	9	Pre-emerge	●	●	●	●	●	●	●	S	●	●	●	●	●	●	●	●	●	
+ Aim (Cleanstart)	14 + 9	Pre-plant	●	●		●	●		●	●		●	●	●	●	●		●	●	●
+ Tribenuron (Express SG)	2 + 9	Pre-plant	●	●						●										●
+ Heat	14 + 9	Pre-plant/pre-emerge	●							●		●	●							●
Linuron	7	Pre-emerge	●																	
Trifluralin (Treflan/Rival)	3	Pre-plant incorporated	●	●	●	●			●											
+ Metribuzin	5	Pre-plant incorporated	●										●	●				●		●

† For tolerance to other dry bean classes, refer to product label

‡ For use in RR Valley only

§ Eastern and American nightshade

S suppression only