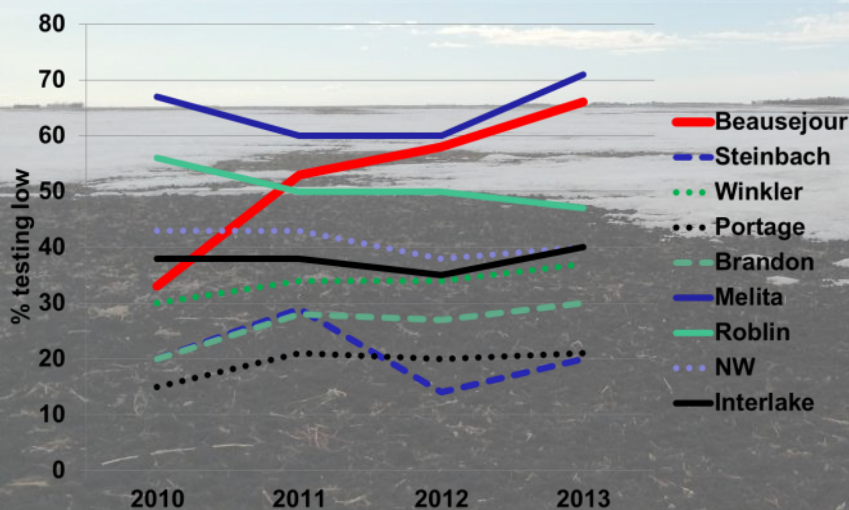


- Long-term soil P fertility strategies
- Soybean optimum plant stand and seeding rates
- Monitor soil temperature
- Seeding tips for peas
- Dry bean fertility, seeding rates and weed control

Figure 1. Soil test P trends in Manitoba
% fields test low in soil P (<10 ppm)



Long-term Soil Phosphorus Strategy

It is a concern in Manitoba that soil phosphorus levels are depleting in some areas, especially around Beausejour, Melita, Brandon and Winkler (Fig 1). Two recent changes in agriculture have contributed to this: a) shift of acres from cereals to soybean and canola, with low tolerance of seed placed P and b) move to low disturbance seeders and planters with low seed bed utilization (total seed bed area used to distribute fertilizer).

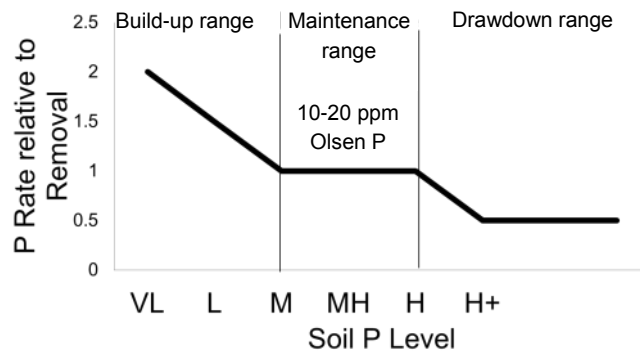
Declining soil P levels are important to acknowledge because soybeans have been shown to respond better to *soil P* compared to *fertilizer P*. Soil fertility specialists in Manitoba are starting to promote a “long term P fertilization strategy for agronomic and environmental sustainability”. This requires growers to consider:

1. What are the soil P levels of your fields? See Figure 2.
2. P addition/removal of all crops in rotation. When you consider how much P is applied to each crop, relative to what is removed through grain, are you in a surplus or deficit balance?

[Use this interactive worksheet to calculate the soil P balance on your farm.](#)

Long Term Soil P Fertility Strategy cont'd.....

Figure 2. Which range of soil P do you keep your fields in?



For crops such as soybean and canola, growers are often in a deficit (P applied < P removed) because of the low tolerance to seed placed P. The tables below demonstrate 4 strategies that can deplete, maintain and build-up soil phosphorus. The strategy that growers should adopt for their soil P fertility program, will depend on what current soil P levels are and what the balance is for their rotation.

- A:** P deficits occur when you use only a short term sufficiency approach and do not exceed safe rates for seed placed P in sensitive crops. This strategy can be used to *draw down high soil P levels*.
- B:** Maximizing seed row P in cereals can reduce the negative balance.
- C:** Soil balance is *maintained* when application = removal through banding away from seed.
- D:** Manure application every 2-5 years to meet N requirements provides enough P for several crops and *can build soil P*. May be supplemented with starter P for crops that are responsive.

A. Using short term P sufficiency strategy and safe rates of seedrow P leads to P deficits.

	Yield bu/ac	P applied lbs/ac	P removed lbs/ac	Annual balance
S Wheat	60	30	35	-5
Canola	40	20	40	-20
W Wheat	75	30	38	-8
Soybeans	35	10	30	-20
		90	143	-53

B. Maximizing seedrow P in cereal phase of rotation can reduce the P deficit.

	Yield bu/ac	P applied lbs/ac	P removed lbs/ac	Annual balance
S Wheat	60	50	35	15
Canola	40	20	40	-20
W Wheat	75	50	38	12
Soybeans	35	10	30	-20
		130	143	-13

C. Banding P away from seed (at planting OR in fall OR pre-seed) enables maintenance every year.

	Yield bu/ac	P applied lbs/ac	P removed lbs/ac	Annual balance
S Wheat	60	35	35	0
Canola	40	40	40	0
W Wheat	75	40	38	+2
Soybeans	35	30	30	-0
		145	143	+2

D. Manure application to meet crop N requirements supplies enough P for several crop years.

	Yield bu/ac	P applied lbs/ac	P removed lbs/ac	Annual balance
S Wheat	60	123	35	88
Canola	40	15	40	-25
W Wheat	75	15	38	-23
Soybeans	35	0	30	-30
		153	143	10

SOYBEAN PLANT STAND AND SEEDING RATES

A study investigating soybean row spacing and plant population was wrapped up in 2013 after 18 site-years of study in Manitoba (Mohr et al. 2014). Here is a summary of the results:

1. **Narrow rows (9-10") produced yields equal to or greater than wide rows (27-30") at all site-years.** The positive yield advantage is due strictly to row spacing, not equipment. The same seeder was used for both row spacing's (every 2nd run blocked to create wide row spacing). This suggests that it may not be beneficial to block runs to create wide rows on drills. There is increasing interest to move towards narrow rows with a planter (i.e. 15") to achieve the benefits of both narrow rows and precision seed placement. The yield advantage in narrow rows found in this study is consistent with data from North Dakota. Narrow row soybeans have higher light interception/utilization. A potential disadvantage of narrow rows may be increased disease susceptibility due to prolonged canopy wetness.
2. **Soybean yield increased with increasing plant stand and then levelled off at 160,000 plants/ac.** This suggests that plant stands higher than 160,000 plants/ac are not likely to produce higher yield. It is well known that soybeans compensate well at reduced plant stands. When the economics of seed cost and soybean price are considered, the economic optimum plant stand falls between 140-160,000 plants/ac.

Target soybean plant stand = 140-160,000 plants/ac

3. **Seeding rates need to be adjusted to account for seed survival.** In a summary of 17 On-Farm field trials in Eastern Manitoba from 2012-2013, average seed survival for soybeans sown with air drills was 71% compared to 80% for planters.

Soybean seeding rates

Air drill = 200-210,000 seeds/ac, Planter = 180-190,000 seeds/ac

Seeding rate (seeds/ac) based on expected seed survival. Seed survival is affected by:	% Seed survival	Air drill	Planter
<ul style="list-style-type: none"> • % Germination (found on seed tag label) • Cracks—putting seed through an auger will increase seed cracks and reduce germination • Environment—cool, wet soil will increase risk of seedling mortality 	65	230,000	-
	70	215,000	215,000
	75	200,000	200,000
	80	190,000	190,000
	85	-	175,000

4. **There is no interaction between row spacing and plant population**—this means that the optimum plant stand is the same at all row spacings.

SOIL TEMPERATURE

Soil temperatures at 5 cm have been hovering around the 0°C mark. Soil temperature is very important for planting soybeans and dry beans and should be at least 10°C. Peas, on the other hand, should be planted as early as possible—[pea seeding tips available here](#).

Manitoba Agriculture has [live soil temperature](#) readings for areas throughout the province [available here](#). Of course, it's also a good idea to use a simple probe thermometer to monitor your own fields.

DRY BEAN FERTILITY

Nutrient uptake and removal of navy and pinto beans was surveyed in 2004/05 in Manitoba. Nutrient removal values (total nutrient removed at harvest with seed) related closely to those reported by the Canadian Fertilizer Institute. Removal rates can be used for soil fertility planning.

Nutrient	Manitoba Observations	Manitoba Observations	Cdn Fertilizer Institute	Total removal	Total removal	Total removal
	Uptake	Removal	Removal	1200 lbs/ac	1600 lbs/ac	2000 lbs/ac
	lbs/cwt			lbs/ac		
N	3.9-4.7	3.0-3.5	4.2	40	53	66
P ₂ O ₅	1.4-1.6	1.1-1.4	1.4	16	21	26
K ₂ O	3.9-4.1	1.9-2.1	1.4	24	32	40
S	0.28-0.34	0.22	0.28	2.6	3.5	4.4
Ca	0.6-3.0	0.07-0.37	0.11			
Mg	0.2-0.5	0.54-0.70	0.11			

Dry bean N recommendations (Manitoba) and P recommendations (North Dakota). N recommendations vary based on production system due to mineralization of organic N during inter-row cultivation.

Dry bean N recommendation					Dry bean P recommendation		
Yield (lbs/ac)	1200		1800		Olsen P (ppm)	Banded P	Broadcast P
	Wide	Narrow	Wide	Narrow		— lbs P ₂ O ₅ /ac —	
Production system							
Soil test N	Wide	Narrow	Wide	Narrow			
20	0	40	35	70	0-3	30	45
30	0	30	30	60	4-7	20	30
40	0	20	25	50	8-11	15	20
50	0	10	20	40	12-15	0	10
60	0	0	15	30	16+	0	0
70	0	0	10	20			

DRY BEAN RECOMMENDED PLANT STANDS

Bean	30"	22"	<12"
	plants/ac		
Pinto	65-75,000	75-85,000	80-90,000
Navy/Black	100-110,000	120-130,000	140-150,000
Kidney	70-85,000	70-85,000	-

$$\text{Seeding rate} = \frac{\text{desired plant stand} \div \text{seeds per lb}}{\div \text{expected survival}}$$

DRY BEAN WEED CONTROL

Pre-Plant Incorporated is a good foundation for a dry bean weed control program. Options for pre-plant include Treflan/Rival/Bonanza/Edge/Eptam/Dual Magnum/Frontier Max. Please note:

- Treflan/Rival/Bonanza - provides good full season control of grasses and control/suppression of several broadleaves. Crop injury may occur on light textured soils low in organic matter or when emergence is delayed
- Treflan/Edge - dry conditions will lead to reduced weed control
- Refer to label directions for rates, crop safety etc.

NEW! Permit is a group 2 Halosulfenuron that received registration for use on dry beans in Manitoba in April 2014. It can be used pre or post emergent.