

Narrowing the Yield Gap of Wide Row Soybeans

Purpose:

Wide rows have a number of advantages including the need for only one piece of planting equipment for corn and beans, lower seeding rates, less lodging, and reduced disease pressure. Wide row (30") soybeans typically have less white mould because of increased air movement, sun penetration, and significantly lower plant populations. One of the most effective management strategies to reduce the impact of white mould is to plant soybeans in wide rows (30" rows) with significantly reduce seeding rates.

The vast majority of soybeans in Ontario are seeding in intermediate row spacing (15" rows) or narrow rows (7.5"). The main issue with wide rows is that they often yield significantly less than narrow rows. Ontario research has shown they can yield as much as 3-5 bu/ac less. It may be possible to overcome this yield drag by promoting early season vegetative growth through starter fertilizer or other management strategies. Previous Ontario research has shown that starter fertilizers can promote early season vegetative growth, which could be used to close the crop canopy faster in wide rows. When using wide rows it also becomes possible to fertilize in a 2X2 band which is an effective way to increase yields in a low soil test field. Another strategy that could reduce the yield drag associated with wide rows is the application of foliar fungicides. When growing soybeans in wide rows it becomes less problematic to spray the crop in season because tramping losses are minimized. Fungicide efficacy may also be improved due to better spray penetration into the crop canopy.

One way to take advantage of no-till while retaining the benefits of some tillage is through strip tillage. With the widespread adoption of auto steer systems, strip tillage is becoming more popular and could play an important role in helping growers overcome the challenge of lower yields often associated with wide row soybeans.

The objectives of this project are to i) quantify the size of the yield lag associated with wide rows at various locations with modern varieties ii) to eliminate the yield lag associated with wide rows through either fertilizer, strip tillage, foliar fungicides or a combination of these factors.

Methods:

Replicated field trials were established at Elora, Borholm, Ridgetown and Winchester. Pioneer Seeds also evaluated wide rows across a number of locations in Eastern Ontario.

Treatments were randomized and replicated three times at each trial location. Each treatment was 20' wide by 60' long. Trials were planted with a Kearney vacuum planter with a precision seed monitor. A strip till unit was used 6-12 hours before seeding (Image 1). All harvesting was completed utilizing a customized combine equipped with a batch weigh system and moisture tester.

Crop Advances: Field Crop Reports



Image #1. Spring strip tillage conducted established in 30" rows.

Results:

The results varied by site. At the Elora research station the yield lag associated with wide rows could be overcome with strip tillage in 2015 (Table 1). Fertilizer and fungicides also increased yields. However, the narrow rows were also highly responsive to management at that site. Overall yields were excellent, which likely contributed to the performance of wide rows.

Table 1. Closing the Yield Gap in Soybeans, Elora 2015

Treatment	Yield Bu/ac
15" no-till (170 000 s/ac)	58.8
30" no-till (170 000 s/ac)	54.0
30" no-till (120 000 s/ac)	52.6
30" strip-till	58.6
30" strip-till + P K (2x2)	62.7
30" strip-till + foliar fungicide	65.0
30" all practices	68.4
15" all practices	66.4
Treatment 3-8 = 120 000 s/ac	
2015 FarmSmart Plot (2 reps) , P = 11 ppm, K = 82 ppm (2 reps)	

A separate trial at Elora resulted in equal yields between the 7.5" no-till drilled beans and 30" strip tilled soybeans (Table 2).

Crop Advances: Field Crop Reports

Table 2. 30" Rows (Strip-till) vs. 7.5" No-till (Elora 2015)

Treatment	Yield Bu/ac
1) 30" Strip-till	56.7
2) 7.5" No-till	57.0
2015 Elora High Yield Plot (4 reps), 200 lbs/ac of 5-20-20 applied with strip tiller or broadcast in no-till. (4 reps)	

The yield lag could not be closed completely through management at the Bornholm location (Table 3). The highest yields were achieved in narrow rows with long season varieties. DS04-D3 have a relative maturity (RM) of 0.4 while Titanium's are a 1.3 RM.

Table 3. Closing the Yield Gap Bonholm 2015

Treatment	Yield Bu/ac
1) 15" no-till (170 000 s/ac)	56.3
2) 15" no-till (120 000 s/ac)	55.8
3) 30" no-till (170 000 s/ac)	51.9
4) 30" no-till (120 000 s/ac)	48.1
5) 30" strip-till	50.4
6) 30" st + P K (2x2)	54.3
7) 30" st + fungicide	54.2
8) 30" all practices	54.0
9) 15" all practices	60.8
10) 15" no-till Variety (P12T82R)	65.3
11) 30" strip-till (P12T82R)	54.8
12) 30" all practices (P12T82R)	59.1
13) 15" no-till Variety (Apex)	67.1
14) 30" strip-till (Apex)	62.5
15) 30" all practices (Apex)	61.8
16) 15" no-till Variety (RR2 Titanium)	69.3
17) 30" strip-till (RR2 Titanium)	61.4
18) 30" strip-till (RR2 Titanium)	62.5
Treatment 1-7 = Variety NK S04-D3, treatments 4-8,11,12,14,15,17,18 = 120 000 s/ac	
Bornholm 2015 (3 reps), P = 15 ppm, K = 119 ppm (3 reps)	

At the Winchester location the yield gap of wide rows could be gained back through management (Table 4).

Table 4. Closing the Yield Gap Winchester 2015.

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Treatment	Yield Bu/ac
1) 15" (170 000)	68.7
2) 15" (120 000)	70.4
3) 30" (120 000)	65.7
4) 30" (170 000)	64.8
5) 30" (120 000) + 80 lbs/ac 11-52-0 and 3 gallons 6-24-6	68.4
6) 30" + 50 lbs/ac N	66.0
7) 30" + Foliar Fungicide	67.5
8) 30" + Foliar Fungicide + Foliar Feeding	69.3
9) 30" + All practices	67.6
Winchester 2015 (4 reps)	

The Pioneer Seeds study showed no yield deficit to wide rows in eastern Ontario during 2015. On average the 30" rows yielded 62.1 bu/ac while the 15" rows yielded 60.1 bu/ac. It should be noted that these fields were highly productive and had a considerable amount of white mould disease pressure. The sites in western Ontario had no white mould.

Summary:

1. On average the yield lag associated with wide rows was relatively small in 2015 and depended on trial location and variety. Since 2015 was an excellent soybean year with many treatments yielding over 60 bu/ac these results will need to be verified in future years.
2. When there was a yield lag in wide rows it could be recovered with various management strategies including strip tillage, fertilizer, or foliar fungicides at most of the sites but not at Bornholm. There was no evidence that wide rows responded more to these inputs than narrow rows.
3. It would appear that in fields that grow tall bushy soybeans there may be no yield lag associated with wide rows if the correct variety is planted and there is adequate moisture. This will depend on good fertility, early planting, and excellent weed control when using wide rows.

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