Atlantic Grains Council (AGC) and Perennia

2015-2017 AGC-NS Soybean Plant Population for Planters or Drills

Summary: Replicated field strip trials in 2015-2017 at nine farm locations throughout Nova Scotia have looked at soybean yield response to lower plant populations. Six trials were done with planters, while three field sites used drill seeders and compared approximately 190,000 seeds per acre to 160,000 and 130,000. Of these nine research trials, there were seven sites that used 15 inch row spacing, while the other two sites were 7.5 inch row spacing. Refer to Table 2 for information on soybean variety used, seeding date and type of seeder at each trial site. At each site the 3 seeding rate treatments were replicated 3 times across the 10 acre test field.

In Table 1, the data on plant population counts at the 1-2 trifoliate growth stage, along with harvest yields and the % crude protein analyzed in the soybean is shown. Plant population for the seven trials that used planters ranged from 178,000 plants down to 100,000 plants per acre. The population counts done at the three trial sites that used drill seeders only ranged from 143,000 plants down to 103,000 plants per acre. The yield results from this research were really surprising. With planters at each of the six sites (and 3 reps per site) there was no real yield difference whether you had plant populations of 135,000-175,000 versus very low populations of around 110,000-130,000 plants per acre. This research indicates that Maritime growers using planters with 15 inch row spacing could use seeding rates of 160,000, if soil and seedbed conditions at planting are adequate to achieve final plant population of 135,000-145,000 per acre.

With drill seeders the AGC-Perennia research was only done on three field sites over two years. It appears with drills a plant population of at least 135,000-145,000 plants per acre are needed for optimal yield. The DalAC research (see Table 3) on the HS 03RY33 variety in drill seeded plots at either 6 or 12 inch row spacing, indicates the population to reach optimal yields perhaps needs to be more in 150,000-165,000 plants per acre range. Until further research on drill seeders can be done, most drills should likely be aiming for a seeding rate of 175,000-185,000 seeds/acre.

It's important when you are heading into a particular field with a drill seeder or planter to consider adjusting your seeding rate based on soil moisture in the seeding zone and surface residue conditions (if no-till), plus your experience with the soybean variety. Soil moisture has a big impact on seedbed preparation, seed placement uniformity and coverage. A good example of the impact of soil conditions at planting on populations and yield is in Table 1 (the two-2016 DeGraaf fields). The same planter, variety and seed settings were used on the two DeGraaf fields, however the first field was a nice sandy loam planted at optimal soil moisture and had plant populations of 90% of the seeding rate settings and high yields at 3900 kg/ha. The other 2016 DeGraaf field, planted 2 days later was a heavier clay loam & not quite as ready to plant, thus ending up with populations of 75% of seeding rate settings and lower yields at 3100 kg/ha.

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Table 1: Soybean Yields & Proteins from 2015-2017 Seeding Rates and Plant Population Trials in Nova Scotia done by Perennia (6 planter & 3 drill seeder trial sites)

Trial Location & Year	Air Drill Seeds/acre Rate Setting	Plant Population Counts/acre	Plant Count % of Seed Rate	% Crude Protein (DM basis)	Yield at 14% Moisture (kg/ha)
2017 Cornwallis Farms	190,000	131,500	69%	38.0 A	3764 A
(Steam Mill, Kings Co.)	160,000	116,800	73%	37.7 A	3598 A
	130,000	102,700	79%	37.6 A	3092 B
2017 Cornwallis Farms	190,000	132,500	70%	40.0 A	3931 A
(Port Williams, Kings Co.)	160,000	114,700	72%	40.0 A	3778 A
	130,000	107,800	83%	39.4 A	3614 A
Trial Location & Year	Planter Seeds/acre Rate Setting	Plant Population Counts/acre	Plant Count % of Seed Rate	Crude Protein % (DM basis)	Yield at 14% Moisture (kg/ha)
2016 Nick DeGraaf's	195,000	178,400	91%	39.2 A	3893 A
(Hillaton, Kings Co.)	167,000	149,300	89%	38.8 A	3933 A
	135,000	120,500	89%	38.8 A	3920 A
2016 Nick DeGraaf's	195,000	150,800	77%	38.7 A	3122 A
(Centreville, Kings Co.)	167,000	126,800	76%	37.4 A	3189 A
	135,000	101,500	75%	37.3 A	3122 A
2016 Dykeview Farms	195,000	132,200	68%	37.7 A	3672 A
(Lower Canard, Kings Co)	165,000	114,400	69%	37.4 A	3707 A
	135,000	99,250	74%	37.5 A	3649 A
2016 G.Damsteegt's	196,000	187,250	96%	40.6 A	3185 A
(Shubenacadie area,	168,000	161,750	96%	40.9 A	3250 A
Colchester County)	136,000	127,900	94%	40.5 A	3085 A
Trial Location & Year	Planter Seeds/acre Rate Setting	Plant Population Counts/acre	Plant Count % of Seed Rate	Crude Protein % (DM basis)	Yield at 14% Moisture (kg/ha)
2015 Nick DeGraaf's	196,000	174,200	89%	38.2 A	3901 A
(Atlanta, Kings County)	169,000	147,400	87%	38.2 A	3981 A
	136,000	118,500	87%	38.1 A	3925 A
2015 Dykeview Farms	190,000	151,900	80%	37.3 A	3884 A
(Centreville, Kings Co.)	160,000	131,100	82%	36.9 A	3820 A
	130,000	107,200	82%	36.9 A	3705 A
	Drill Seeder Seeds/acre	Plant Pops Counts/acre	Plants % of Seed Rate	Protein % (DM basis)	Yield @ 14% (kg/ha)
2015 Baybend Farms	190,000	143,100	75%	37.5 A	3562 A
Old Barns, Colchester Co.	160,000	129,700	81%	37.4 A	3431 A
	130,000	124,900	96%	37.2 A	3118 A

Plant counts were done at 1-2 trifoliate growth stage with 20 counts per plot.
Crude protein or yield means followed by the same letter are not significantly different at $\alpha = 0.05$
For all sites data was analysed using Minitab 17 Statistical Software. ANOVA was performed using General Linear Model. Means Comparison was done with the Tukey Method at 95% confidence.

Table 2: AGC-Perennia 2015-2017 Trial Cooperator, Variety, Planting Date & Seeders

Grower	Soybean Variety	Planting Date	Planter Used	Seed Rate Adjustment
2015 Dykeview Farms	Hyland HS 03RY33 (2625 CHU)	May 19	JD 1790 Vacuum **Planter** (Split 24 at 15" rows)	Seedstar in-cab monitor
2015 Nick DeGraaf's	Syngenta S10-P9 (2800 CHU)	May 18	JD 1780 Max Emerge XP Vacuum **Planter** (15"row)	Move chain onto right driven-driver sprockets
2015 Duncan McCurdy's	Syngenta S07-P9 (2450 CHU)	May 27	Sunflower 9412 No-till **Drill** (15" row spacing)	Adjust fluted seed metering wheels
2016 Dykeview Farms	Hyland HS 03RY33 (2625 CHU)	May 11	JD 1790 Vacuum **Planter** (Split 24 at 15" rows)	Seedstar in-cab monitor
2016 Nick DeGraaf's	Syngenta S10-P9 (2800 CHU)	May 19 & May 21	Case 1240 AFS 38' **Planter** (15" row spacing)	In-cab monitor
2016 Gerrit Damsteegt's	Pioneer P06T28R (2650 CHU)	May 20	JD 1780 Max Emerge XP Vacuum **Planter**(15"row)	Move chain onto right driven-driver sprockets
Cornwallis Farms 2017	Hyland HS 03RY33 (2625 CHU)	May 13 & May 13	JD 1910 No-till **Air-Drill** (7.5" row spacing)	Calibration weights put into in-cab system

Table 3: Soybean Yields & Crude Proteins from 2016-2017 Plant Population & Row Spacing Trials done by DalAC (2 Truro & 2 Canning, NS trial sites)

	Soybean Variety Used	Row Spacing Tested with Drill (inches)	Plant Population Counts/acre	% Crude Protein (DM basis)	Yield at 13% Moisture (kg/ha)
2016 & 2017 combined	HS 03RY33	6"	207,500	39.8	3672
data from 4 NS test sites	HS 03RY33	6"	177,100	40.7	3561
	HS 03RY33	6"	169,300	39.4	3541
2016 & 2017 combined	HS 03RY33	12"	191,300	40.3	3801
data from 4 NS test sites	HS 03RY33	12"	175,200	40.2	3627
	HS 03RY33	12"	136,000	40.1	3496