NDSU North Central Research Extension Center
2017 Hard Red Spring Wheat Variety Trial at Minot

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2015	2016	2017	--- Average --- 2 year	3 year
	DAP[1]	inches	lbs/bu	%	bu/A				
LCS Nitro	60	23	57.6	14.6	83.3	109.1	49.0	79.0	80.5
Prosper	58	25	59.1	15.6	78.8	93.8	55.4	74.6	76.0
HRS 3419	63	26	58.7	15.2	82.2	83.8	53.4	68.6	73.1
Redstone	64	29	58.8	14.8	74.8	86.2	55.6	70.9	72.2
Faller	58	23	58.4	15.7	82.4	84.2	49.9	67.1	72.2
HRS 3530	59	27	57.7	15.7	90.2	73.5	51.3	62.4	71.7
SY Ingmar	56	22	60.5	16.3	81.3	84.6	47.7	66.1	71.2
Rollag	55	22	60.2	15.8	81.8	74.6	53.6	64.1	70.0
SY Valda	55	22	58.9	15.8	88.3	77.1	43.7	60.4	69.7
WB9653	56	22	58.9	16.1	73.0	87.5	47.7	67.6	69.4
Elgin-ND	56	27	58.9	15.8	72.5	80.0	50.8	65.4	67.8
HRS 3504	56	22	59.3	16.3	74.1	83.6	43.6	63.6	67.1
MS Chevelle	54	22	60.2	15.2	68.8	86.7	45.2	66.0	66.9
ND901CL+	57	26	60.4	16.7	74.7	69.9	54.5	62.2	66.4
SY Rowyn	55	24	59.0	16.0	80.3	70.5	46.6	58.5	65.8
Glenn	54	26	60.8	16.1	68.0	76.4	50.6	63.5	65.0
LCS Prime	54	23	60.7	14.7	72.4	77.7	44.7	61.2	64.9
SY Soren	55	21	61.0	16.1	74.1	68.6	50.8	59.7	64.5
Shelly	59	21	60.2	15.2	74.3	71.2	47.1	59.2	64.2
LCS Breakaway	55	21	59.8	16.8	70.2	86.9	34.9	60.9	64.0
Prevail	54	22	60.6	15.6	76.5	64.2	48.9	56.5	63.2
Surpass	53	20	60.6	15.6	78.9	68.6	40.7	54.7	62.7
Mott	58	24	58.8	16.2	78.0	66.9	42.9	54.9	62.6
Bolles	58	26	58.8	17.3	68.6	70.2	48.6	59.4	62.5
WB-Mayville	55	21	59.3	15.7	66.2	69.7	49.8	59.7	61.9
Linkert	55	21	61.0	16.4	68.6	77.5	39.2	58.3	61.8
Boost	58	26	59.4	16.3	69.1	66.0	49.3	57.6	61.5
ND-VitPro	54	22	61.2	16.6	68.7	79.5	35.2	57.3	61.1
Barlow	55	27	61.1	16.0	68.5	63.6	48.2	55.9	60.1
TCG-Spitfire	60	25	58.4	14.7	--	87.7	64.0	75.9	--
Lang-MN	59	23	59.1	16.2	--	80.6	46.9	63.8	--
HRS 3616	56	25	58.7	16.5	--	75.6	48.3	62.0	--
Egan	58	26	57.3	17.4	--	71.0	48.3	59.6	--
LCS Anchor	53	20	61.0	15.9	--	72.5	34.6	53.5	--
TCG-Cornerstone	55	23	57.8	15.8	--	60.7	44.0	52.4	--
WB9719	57	23	61.5	15.3	--	--	58.3	--	--
AKF-Astro	57	28	58.4	14.3	--	--	56.6	--	--
WB9479	56	22	57.7	16.2	--	--	54.2	--	--
WB9590	54	21	59.2	16.0	--	--	51.6	--	--
SY Rockford	58	24	56.9	15.8	--	--	50.6	--	--
LCS Trigger	64	24	57.3	14.2	--	--	49.2	--	--
TCG-Climax	61	25	60.6	16.6	--	--	48.8	--	--
Dyna-Gro Ambush	54	24	60.5	16.1	--	--	48.1	--	--
Dyna-Gro Caliber	57	20	59.2	16.1	--	--	48.0	--	--
MS Camaro	55	21	59.6	16.1	--	--	46.9	--	--
LCS Rebel	54	26	55.7	16.3	--	--	46.8	--	--
HRS 3100	57	21	59.7	16.8	--	--	38.9	--	--
Trial Mean	56	24	59.5	16.0	73.2	77.2	48.1	--	--
C.V.%	2.0	7.7	1.8	2.1	7.4	10.5	12.7	--	--
LSD 5%	2	3	1.8	0.5	7.5	13.1	9.9	--	--
LSD 10%	2	2	1.5	0.5	6.3	11.0	8.3	--	--

[1] *DAP = Days after planting.*

No-till planted on April 19 with a seeding rate of 1.25 million PLS/A and harvested on July 31.

Previous Crop: 2014 = flax, 2015 = soybean, 2016 = canola.

Soil Type: Williams Loam

NDSU North Central Research Extension Center
2017 Hard Red Spring Wheat Variety Trial at Mohall
Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

Variety	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2015	2016	2017	-- Average -- 2 yr	3 yr
	inches	0-9*	lbs/bu	%	bu/A				
Faller	34	0	56.9	13.0	87.3	87.5	74.2	80.8	83.0
Elgin-ND	34	0	58.1	14.0	77.1	82.3	79.1	80.7	79.5
Redstone	31	0	57.4	13.8	71.8	96.9	68.3	82.6	79.0
SY Ingmar	32	0	60.1	14.0	72.6	82.2	80.3	81.3	78.4
Prosper	34	0	56.3	13.7	80.4	87.7	65.1	76.4	77.7
LCS Nitro	31	0	56.1	13.3	80.5	85.8	66.7	76.3	77.7
SY Soren	32	0	58.9	13.9	69.4	80.0	75.6	77.8	75.0
Barlow	36	0	60.9	14.0	63.0	79.1	82.8	80.9	75.0
Glenn	37	0	61.4	14.8	71.5	79.2	73.8	76.5	74.8
Bolles	31	0	58.2	15.5	76.6	74.2	68.7	71.5	73.2
SY Valda	30	0	60.3	13.1	--	84.2	84.4	84.3	--
Shelly	31	0	60.1	13.1	--	84.2	82.4	83.3	--
LCS Prime	34	0	59.4	12.7	--	82.9	83.4	83.1	--
HRS 3530	35	0	57.5	13.9	--	84.7	71.2	78.0	--
Boost	32	0	60.3	14.3	--	76.5	79.2	77.9	--
Linkert	29	0	60.2	14.5	--	69.1	83.4	76.3	--
ND VitPro	32	0	60.5	15.0	--	74.8	75.8	75.3	--
HRS 3419	31	0	57.1	13.2	--	80.0	68.5	74.2	--
Surpass	35	0	59.7	12.7	--	--	88.3	--	--
WB9653	31	0	56.9	13.7	--	--	76.1	--	--
Lang-MN	33	0	60.2	14.6	--	--	75.3	--	--
SY Rowyn	32	0	58.2	13.4	--	--	71.1	--	--
Trial Mean	33	0	59.0	13.9	73.1	81.1	75.3	--	--
C.V.%	7.4	0	1.7	4.8	8.2	7.4	6.5	--	--
LSD 5%	3	NS	1.4	0.9	8.4	8.4	6.9	--	--
LSD 10%	3	NS	1.2	0.8	7.0	7.0	5.7	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1.25 million PLS/A and harvested on August 17.
Previous Crop: 2014 = oat, 2015 = sunflower, 2016 = durum.
Tillage: minimum till
Soil Type: Barnes loam

NDSU North Central Research Extension Center
2017 Hard Red Spring Wheat Variety Trial at Rugby
Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

Variety	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2015	2016	2017	-- Average -- 2 yr	3 yr
	inches	0-9*	lbs/bu	%	----------bu/A----------				
LCS Nitro	26	0	58.4	13.3	81.7	78.3	68.7	73.5	76.2
Prosper	27	0	58.7	14.2	81.6	82.5	54.6	68.5	72.9
Elgin-ND	30	0	59.2	14.6	72.3	74.2	71.4	72.8	72.6
Faller	28	0	59.5	13.7	74.8	81.8	59.8	70.8	72.1
Redstone	26	0	57.4	13.7	72.8	77.1	64.0	70.5	71.3
SY Ingmar	26	0	58.8	14.9	72.7	74.1	64.6	69.3	70.5
SY Soren	26	0	59.1	14.7	67.5	74.1	59.7	66.9	67.1
Barlow	31	0	59.1	15.0	64.6	68.6	66.4	67.5	66.5
Glenn	30	0	59.8	15.4	67.9	66.0	54.5	60.3	62.8
Bolles	26	0	59.4	16.5	71.9	68.4	45.3	56.8	61.9
SY Valda	26	0	60.3	13.9	--	80.8	63.1	71.9	--
HRS3530	30	0	58.4	14.7	--	77.0	63.5	70.2	--
Linkert	26	0	59.4	14.9	--	66.4	71.3	68.9	--
HRS 3419	27	0	57.9	13.6	--	72.9	63.7	68.3	--
LCS Prime	27	0	59.3	13.8	--	75.6	53.9	64.8	--
Shelly	25	0	58.7	13.6	--	66.7	59.0	62.9	--
ND VitPro	27	0	57.7	15.4	--	69.2	49.0	59.1	--
Boost	25	0	59.5	15.3	--	68.8	46.9	57.8	--
WB9653	25	0	58.6	13.7	--	--	63.7	--	--
SY Rowyn	25	0	58.6	14.0	--	--	59.0	--	--
Lang-MN	27	0	58.3	15.1	--	--	58.2	--	--
Surpass	26	0	57.2	14.2	--	--	52.5	--	--
Trial Mean	33	0	59.0	13.9	73.1	81.1	75.3	--	--
C.V.%	7.4	0	1.7	4.8	8.2	7.4	6.5	--	--
LSD 5%	3	NS	1.4	0.9	8.4	8.4	6.9	--	--
LSD 10%	3	NS	1.2	0.8	7.0	7.0	5.7	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1.25 million PLS/A and harvested on August 17.
Previous Crop: 2014 = soybean, 2015 = wheat, 2016 = field pea.
Tillage: minimum till
Soil Type: Gardena silt loam

2017 Hard Red Spring Wheat Variety Trial at Garrison

Cooperator: Mike Zimmerman, Garrison

					Grain Yield				
		Plant	Test					-- Average --	
Variety	Sawfly	Height	Weight	Protein	2015	2016	2017	2 yr	3 yr
	0-9*	inches	lbs/bu	%	----------bu/A----------				
Faller	3	20	52.2	15.4	52.4	65.1	17.5	41.3	45.0
Prosper	2	21	51.8	15.9	54.4	62.8	17.6	40.2	44.9
SY Ingmar	4	18	54.0	15.3	51.3	62.6	17.2	39.9	43.7
Elgin-ND	2	20	52.1	15.5	48.8	60.6	20.3	40.5	43.2
LCS Nitro	4	20	53.5	14.3	47.3	59.2	20.3	39.8	42.3
SY Soren	2	19	54.0	15.8	49.1	60.4	17.1	38.8	42.2
Barlow	2	19	55.5	16.1	47.9	56.7	16.4	36.5	40.3
Redstone	6	19	53.8	15.6	39.4	63.9	14.4	39.1	39.2
Bolles	3	21	53.0	16.7	36.0	61.1	18.6	39.9	38.6
Glenn	2	21	55.2	15.6	38.3	56.1	18.9	37.5	37.8
SY Valda	2	19	55.1	15.4	--	69.4	22.8	46.1	--
LCS Prime	2	20	56.5	13.6	--	68.4	22.4	45.4	--
HRS 3530	2	22	53.1	15.7	--	66.0	19.6	42.8	--
ND VitPro	1	21	55.3	15.5	--	58.7	24.2	41.4	--
Shelly	3	18	53.7	15.5	--	62.2	19.9	41.0	--
Linkert	2	19	56.7	15.5	--	57.8	20.1	38.9	--
HRS 3419	5	19	52.4	16.1	--	63.2	14.3	38.7	--
Boost	2	18	54.4	15.8	--	59.4	17.5	38.4	--
WB9653	3	19	54.0	14.8	--	--	22.2	--	--
Lang-MN	2	20	54.4	15.3	--	--	21.8	--	--
SY Rowyn	2	18	53.5	15.4	--	--	17.7	--	--
Surpass	1	16	53.7	14.6	--	--	10.4	--	--
Trial Mean	2	20	54.2	15.4	45.8	62.0	18.9	--	--
C.V.%	52	10.3	3.0	5.2	7.7	8.8	19.9	--	--
LSD 5%	2	3	2.3	1.1	5.0	7.7	5.3	--	--
LSD 10%	1	2	1.9	0.9	4.2	6.5	4.4	--	--

**Lodging caused by wheat stem sawfly: 0 = none, 9 = lying flat on the ground.*

NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.25 million PLS/A and harvested on August 8.

Previous Crop: 2014 = barley, 2015 = canola, 2016 = barley.

Tillage: no-till

Soil Type: Williams Bowbells loam

Note: The 2017 trial sustained severe drought and an infestation of wheat stem sawfly.

NDSU North Central Research Extension Center
2017 Hard Red Spring Wheat Variety Trial at Wilton
Cooperator: Rod Binstock, Baldwin

Variety	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2015	2016	2017	-- Average -- 2 yr	3 yr
	inches	0-9*	lbs/bu	%	bu/A				
SY Ingmar	25	0	51.2	16.0	63.1	80.2	37.5	58.8	60.3
Faller	26	0	49.5	15.4	55.6	83.5	40.8	62.1	60.0
LCS Nitro	26	0	51.7	15.0	62.8	78.0	37.9	57.9	59.6
Prosper	26	0	49.0	15.6	58.5	85.2	33.3	59.2	59.0
Elgin-ND	30	0	49.0	16.2	56.7	80.6	39.6	60.1	59.0
Barlow	28	0	50.7	15.9	56.2	74.3	40.2	57.3	56.9
SY Soren	24	0	52.5	15.7	58.1	72.2	39.6	55.9	56.6
Redstone	28	0	51.7	16.6	53.9	85.2	29.2	57.2	56.1
Glenn	28	0	52.5	15.8	58.8	72.9	36.3	54.6	56.0
Bolles	28	0	52.1	17.1	49.2	74.1	37.1	55.6	53.5
LCS Prime	28	0	47.6	14.5	--	88.2	42.7	65.5	--
SY Valda	25	0	52.3	15.5	--	87.4	42.9	65.2	--
HRS3530	29	0	50.9	16.0	--	83.8	40.3	62.1	--
Shelly	25	0	53.0	15.0	--	83.1	38.0	60.6	--
Boost	27	0	52.2	15.8	--	79.1	38.3	58.7	--
Linkert	23	0	53.1	15.7	--	73.3	40.4	56.8	--
ND VitPro	27	0	51.1	16.0	--	75.3	37.8	56.5	--
HRS 3419	27	0	51.3	16.2	--	72.6	26.6	49.6	--
WB9653	25	0	51.4	15.1	--	--	46.6	--	--
Lang-MN	29	0	53.2	16.2	--	--	40.5	--	--
SY Rowyn	25	0	52.8	15.7	--	--	39.1	--	--
Surpass	25	0	52.5	14.9	--	--	38.6	--	--
Trial Mean	27	0	51.6	15.7	58.0	79.2	38.4	--	--
C.V.%	6.1	0	2.5	2.4	6.8	5.5	9.1	--	--
LSD 5%	2	NS	1.8	0.5	5.5	6.2	5.0	--	--
LSD 10%	2	NS	1.5	0.4	4.6	5.2	4.1	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.25 million PLS/A and harvested on August 8.
Previous Crop: 2014 = wheat, 2015 = soy, 2016 = wheat.
Tillage: no-till
Soil Type: Williams loam
Note: The 2017 trial sustained severe drought and moderate hail injury.

NDSU North Central Research Extension Center
2017 Late Planted Hard Red Spring Wheat Variety Trial at Minot

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2015	2016	2017	Average 2 year	Average 3 year
	DAP[1]	inches	lbs/bu	%	bu/A				
Elgin-ND	44	24	61.1	15.8	44.0	46.5	38.4	42.5	43.0
Glenn	42	24	62.6	16.5	32.6	55.2	40.6	47.9	42.8
Prevail	41	22	60.5	15.5	40.8	49.8	36.8	43.3	42.5
Barlow	41	22	62.0	16.4	41.0	53.8	31.9	42.8	42.2
Prosper	44	23	61.3	15.1	35.2	45.7	45.0	45.3	42.0
Linkert	43	18	61.6	16.6	40.6	50.9	30.0	40.4	40.5
SY Soren	41	17	60.6	17.2	40.1	44.0	29.8	36.9	38.0
SY Ingmar	43	19	61.6	17.7	38.9	46.3	26.5	36.4	37.2
SY Rowyn	43	20	60.7	17.5	42.0	43.1	26.2	34.6	37.1
Faller	45	22	60.6	14.7	35.4	41.5	34.0	37.7	37.0
ND901CL+	43	24	58.8	18.5	37.6	42.3	27.8	35.1	35.9
Mott	45	24	61.3	16.4	40.0	35.0	30.8	32.9	35.3
Bolles	46	21	59.9	18.7	38.2	41.4	26.2	33.8	35.3
Redstone	48	23	60.8	16.4	32.0	34.0	37.3	35.6	34.4
HRS 3419	48	22	58.5	16.6	27.8	43.6	26.4	35.0	32.6
LCS Nitro	48	20	59.2	16.8	31.0	36.2	26.6	31.4	31.3
HRS 3530	47	23	59.8	16.5	--	45.0	34.1	39.6	26.4
SY Valda	43	20	62.1	15.2	--	52.1	34.9	43.5	--
LCS Prime	41	23	62.1	15.0	--	51.5	35.6	43.5	--
ND-VitPro	41	21	62.3	16.7	--	50.4	30.3	40.3	--
Shelly	45	20	62.3	15.2	--	44.8	35.1	39.9	--
Boost	45	21	60.0	16.4	--	49.4	27.5	38.4	--
MS Chevelle	42	19	60.4	16.6	--	42.9	27.7	35.3	--
Surpass	40	22	61.6	15.2	--	--	45.4	--	--
TCG-Spitfire	45	20	62.0	16.5	--	--	35.2	--	--
Lang-MN	47	22	61.3	15.7	--	--	31.2	--	--
Trial Mean	44	22	61.0	16.5	38.2	45.1	32.3	--	--
C.V.%	2.3	7.9	1.2	2.3	10.5	12.5	9.8	--	--
LSD 5%	2	3	1.2	0.6	5.6	9.2	5.2	--	--
LSD 10%	1	2	1.0	0.5	4.7	7.7	4.3	--	--

[1] *DAP = Days after planting.*

2017: No-till planted into soybean stubble on June 12 and harvested on September 12.
2016: No-till planted into soybean stubble on June 9 and harvested on September 14.
2015: No-till planted into flax stubble on June 9 and harvested on September 12.
Planting Rate: 1.25 million PLS/A
Soil Type: Williams Loam

NDSU North Central Research Extension Center
2017 HRSW Yield Results from the North Central Region **Combined Means**

Variety	Sawfly	Lodging	Days to Head	Plant Height	Test Weight	Protein	Grain Yield				
							2015	2016	2017	Average 2 Year	Average 3 Year
	0-9*	0-9*	DAP[1]	inches	lbs/bu	%	bu/A				
Prosper	2	0	51	26	56.0	15.0	64.8	76.3	45.1	60.7	62.1
Faller	3	0	51	26	56.2	14.7	64.7	73.9	46.0	60.0	61.5
LCS Nitro	4	0	54	25	56.1	14.5	64.4	74.4	44.9	59.6	61.2
Elgin-ND	2	0	50	27	56.4	15.3	61.9	70.7	49.9	60.3	60.8
SY Ingmar	4	0	50	24	57.7	15.7	63.3	71.7	45.6	58.6	60.2
Redstone	6	0	56	26	56.7	15.2	57.5	73.9	44.8	59.3	58.7
SY Soren	2	0	48	23	57.7	15.6	59.7	66.6	45.4	56.0	57.2
Barlow	2	0	48	27	58.2	15.6	56.9	66.0	47.6	56.8	56.8
Glenn	2	0	48	28	58.7	15.7	56.2	67.6	45.8	56.7	56.5
Bolles	3	0	52	26	56.9	17.0	56.8	64.9	40.7	52.8	54.1
SY Valda	2	0	49	24	58.2	14.8	--	75.2	48.6	61.9	--
LCS Prime	2	0	47	26	57.6	14.1	--	74.1	47.1	60.6	--
HRS 3530	2	0	53	28	56.2	15.4	--	71.7	46.7	59.2	--
Shelly	3	0	52	23	58.0	14.6	--	68.7	46.9	57.8	--
Linkert	2	0	49	23	58.6	15.6	--	65.8	47.4	56.6	--
HRS 3419	5	0	55	26	56.0	15.2	--	69.4	42.1	55.7	--
ND-VitPro	1	0	48	25	58.0	15.9	--	68.0	42.0	55.0	--
Boost	2	0	51	25	57.6	15.7	--	66.5	43.1	54.8	--
SY Rowyn	2	0	49	24	57.1	15.3	--	--	43.3	--	--
Surpass	1	0	47	24	57.5	14.5	--	--	46.0	--	--
Lang-MN	2	0	53	26	57.8	15.5	--	--	45.7	--	--
	1	3	2	6	6	6	6	6	6	12	18

**Lodging: 0 = none, 9 = lying flat on the ground.*

Locations: Minot, Minot Late Seeded, Garrison, Mohall, Rugby, Wilton

NDSU North Central Research Extension Center
2017 Spring Wheat Plantback onto Barley + Cover Crop Stubble

2016 Cover Crop Treatments	Days to Head	15-Jul NDVI	Plant Height	Test Weight	Protein	Grain Yield
	DAP[1]	0 - 1	inches	lbs/bu	%	bu/A
No cover crop	60	0.40	26	61.0	13.0	30.5
CC planted with barley	59	0.39	25	61.0	13.1	35.8
CC broadcast over 4 leaf barley	60	0.42	25	61.6	13.0	36.1
CC broadcast over early headed barley	60	0.37	25	60.4	12.9	29.0
CC planted after barley harvest	60	0.40	24	60.9	13.0	34.3
CC planted with barley + flax post-harvest	59	0.40	27	60.8	13.1	35.3
Trial Mean	60	0.40	25	61.0	13.0	33.5
C.V.%	2.3	13.90	8.2	1.2	7.9	11.5
LSD 5%	NS	NS	NS	NS	NS	NS

[1] *DAP = Days after planting.* *NS = no statistical difference between cover crop treatments.*
Planting Date: April 21 *Variety: Barlow* *Harvest Date: August 14*
Notes: The trial did not receive any applied fertilizer. The Trial sustained moderate drought stress.

2016 Barley Interseeded with Cover Crops at Minot

Cover Crop Treatment	Cover Crop Planting Date	Days to Head	NDVI	Plant Height	Lodging	% Plump	% Thin	1000 KWT	Test Weight	Protein	Grain Yield	Cover Crop Biomass[3]
		DAP[1]	0-1	inches	0-9[2]	>6/64	<5/64	g	lbs/bu	%	bu/A	lbs/A
No cover crop	--	52	0.47	32	4	94	1	41	49.6	11.5	109.4	944
CC planted with barley	May 6	52	0.49	33	6	94	1	41	49.8	12.9	115.8	1061
CC broadcast over 4 leaf barley	June 4	52	0.49	32	5	93	1	40	49.6	12.5	116.7	833
CC broadcast over early headed barley	June 27	52	0.47	32	3	94	1	41	49.8	12.0	111.7	982
CC planted after barley harvest	Aug. 15	52	0.50	32	3	94	1	41	49.9	12.4	107.4	1258
CC planted with barley + flax post-harvest	5/6 + 8/15	53	0.50	32	3	96	1	42	50.1	12.0	110.1	1340
Trial Mean		52	0.48	32	4	94	1	41	49.8	12.2	111.8	1070
C.V.%		1.6	5.6	6.2	48	1.8	31	2.6	1.1	8.4	5.4	20.0
LSD 0.05		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	322

[1] *DAP = Days after planting.* [2] *Lodging: 0 = none, 9 = lying flat on the ground.*
[3] *Cover crop biomass includes all green plant material (cover crop + volunteer barley) at the end of the growing season. Biomass was harvested on Oct. 14 and reported on a dry weight basis.*
NS = no statistical difference between cover crop treatments.

Barley Variety: Tradition *Planting Date: May 6* *Harvest Date: August 11*
Cover Crop Mix: turnip, radish, lentil and flax *Previous Crop: canola* *Tillage System: No-till*
Soil Type: Williams Loam

NDSU North Central Research Extension Center
2017 Sulfur by Nitrogen Fertility in No-Till Spring Wheat at Minot

	Applied Fertilizer[1]		Days to	NDVI at	Plant		Test	1000	Grain	Grain
Trt	Nitrogen	Sulfur	Head	Anthesis	Height	Lodging	Weight	KWT	Protein	Yield
	pounds per acre		DAP[2]	0-1	inches	0-9[3]	lbs/bu	g	%	bu/A
1	0	0	51	0.41	23	0	61.3	31	12.7	36.7
2	0	10	51	0.46	25	0	61.5	29	12.7	43.1
3	0	20	51	0.44	25	0	61.5	31	13.0	41.9
4	50	0	51	0.47	24	0	61.4	30	13.0	46.3
5	50	10	51	0.49	26	0	61.1	31	13.1	45.5
6	50	20	51	0.47	25	0	60.7	31	13.5	41.1
7	100	0	51	0.45	24	0	61.0	30	13.8	41.8
8	100	10	52	0.50	26	0	61.0	31	13.7	44.1
9	100	20	51	0.46	25	0	60.9	31	13.9	45.8
10	150	0	52	0.48	26	0	61.1	30	14.1	42.4
11	150	10	51	0.50	25	0	60.8	31	14.2	48.0
12	150	20	51	0.47	26	0	60.8	32	14.1	45.7
13	200	0	51	0.48	26	0	61.0	31	14.1	46.6
14	200	10	51	0.48	26	0	60.8	31	14.3	48.3
15	200	20	51	0.51	25	0	61.0	30	14.3	46.4
16	46*	0	51	0.42	24	0	61.3	31	13.1	38.3
17	46**	0	51	0.46	25	0	61.2	30	13.3	40.9
18	100***	10	51	0.48	24	0	61.2	31	13.7	45.3
Trial Mean			51	0.47	25	0	61.1	31	13.6	43.8
C.V. %			0.7	6.9	5.1	0.0	0.6	3	3.1	9.4
LSD 0.05			NS	0.05	NS	NS	NS	NS	0.7	NS

[1] Pounds of N applied as Urea and S as AMS through a mid-row band at planting.

[2] Days after planting.

[3] Lodging: 0 = none, 9 = lying flat on the ground.

**broadcast at tillering (June 8)*

***broadcast at anthesis (June 28)*

****100 lbs/A N + 10 lbs/A S + 100 lbs/A Potash applied in a mid-row band at planting.*

ns = no statistical difference between treatments.

Planting Date: May 3
Variety = Barlow HRSW
Harvest Date: August 14
Seeding Rate: 1.25 million live seeds / acre
Previous Crop: Soybean
Tillage System: No-till
Soil Type: Williams loam
Soil Test: N = 45 lbs/A (0-24"), P = 14 ppm (0-6")

NDSU North Central Research Extension Center
2017 Durum Variety Trial at Mohall
Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

					Grain Yield				
	Plant		Test					-- Average --	
Variety	Height	Lodging	Weight	Protein	2015	2016	2017	2 year	3 year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Joppa	35	0	60.0	12.2	66.0	93.8	74.0	83.9	77.9
Grenora	32	0	58.3	12.9	64.7	87.2	72.4	79.8	74.8
Mountrail	33	0	58.5	12.6	67.2	87.0	68.1	77.5	74.1
Carpio	35	0	59.7	12.4	64.7	88.0	67.0	77.5	73.2
Alkabo	31	0	59.3	12.5	63.3	85.1	63.8	74.4	70.7
Divide	34	0	58.9	13.2	64.0	85.7	56.5	71.1	68.7
ND Riveland	37	0	59.2	13.0	--	92.1	69.0	80.5	--
ND Grano	33	0	59.3	12.6	--	90.7	61.3	76.0	--
VT Peak	35	0	60.1	12.7	--	--	70.4	--	--
Trial Mean	34	0	59.4	12.7	64.2	88.7	67.5	--	--
C.V.%	4.3	0	1.0	4.7	3.9	4.5	7.8	--	--
LSD 5%	2	NS	0.8	0.9	3.7	5.8	7.7	--	--
LSD 10%	2	NS	0.7	0.7	3.0	4.8	6.4	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1.5 million PLS/A and harvested on August 17.
Previous Crop: 2014 = oat, 2015 = sunflower, 2016 = durum.
Tillage: minimum till Soil Type: Barnes loam

2017 Durum Variety Trial at Rugby
Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

					Grain Yield				
	Plant		Test					-- Average --	
Variety	Height	Lodging	Weight	Protein	2015	2016	2017	2 year	3 year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Carpio	28	0	59.6	14.1	66.5	64.7	64.9	64.8	65.4
Joppa	26	0	59.9	14.5	72.2	74.5	48.4	61.5	65.0
Grenora	25	0	59.7	15.0	75.6	72.9	45.8	59.3	64.8
Alkabo	25	0	60.2	14.4	76.2	71.9	45.7	58.8	64.6
Mountrail	22	0	59.9	14.7	73.7	76.0	41.2	58.6	63.6
Divide	27	0	59.6	14.9	71.0	69.7	41.6	55.6	60.8
ND Grano	27	0	59.7	14.8	--	71.0	63.4	67.2	--
ND Riveland	28	0	61.7	14.7	--	80.5	70.8	75.6	--
VT Peak	25	0	59.8	15.4	--	--	43.6	--	--
Trial Mean	26	0	59.9	14.8	71.8	73.1	52.0	--	--
C.V.%	5.7	0	1.4	1.8	4.0	3.5	12.7	--	--
LSD 5%	3	NS	1.4	0.4	4.2	3.7	11.3	--	--
LSD 10%	2	NS	1.1	0.4	3.4	3.1	9.4	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1.5 million PLS/A and harvested on August 17.
Previous Crop: 2014 = soybean, 2015 = wheat, 2016 = field pea.
Tillage: minimum till
Soil Type: Gardena silt loam

NDSU North Central Research Extension Center
2017 Durum Variety Trial at Garrison
Cooperator: Mike Zimmerman, Garrison

					Grain Yield				
		Plant	Test					-- Average --	
Variety	Sawfly	Height	Weight	Protein	2015	2016	2017	2 yr	3 yr
	0-9*	inches	lbs/bu	%	----------bu/A----------				
Mountrail	2	21	55.9	13.4	41.1	60.1	20.7	40.4	40.6
Divide	2	22	56.1	13.7	42.1	60.4	19.1	39.8	40.5
Alkabo	4	21	57.0	13.3	34.6	61.9	19.6	40.8	38.7
Carpio	2	21	55.7	12.8	31.0	63.5	18.3	40.9	37.6
Grenora	2	18	54.6	13.9	36.3	56.8	18.3	37.5	37.1
Joppa	2	19	56.1	13.3	35.9	58.3	16.7	37.5	37.0
ND Grano	4	21	55.4	14.8	--	60.8	18.8	39.8	--
ND Riveland	3	21	56.6	14.4	--	60.0	21.4	40.7	--
VT Peak	2	21	56.0	14.3	--	--	17.2	--	--
Trial Mean	3	21	56.0	13.8	36.6	60.3	19.0	--	--
C.V.%	49	9.9	1.6	3.3	7.3	7.7	21.6	--	--
LSD 5%	NS	NS	1.3	0.7	4.0	NS	NS	--	--
LSD 10%	NS	NS	1.0	0.5	3.2	NS	NS	--	--

**Lodging caused by wheat stem sawfly: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.5 million PLS/A and harvested on August 8.
Previous Crop: 2014 = barley, 2015 = canola, 2016 = barley.
Tillage: no-till
Soil Type: Williams Bowbells loam
Note: The 2017 trial sustained severe drought and an infestation of wheat stem sawfly.

NDSU North Central Research Extension Center
2017 Durum Variety Trial at Wilton
Cooperator: Rod Binstock, Baldwin

					Grain Yield				
	Plant		Test					-- Average --	
Variety	Height	Lodging	Weight	Protein	2015	2016	2017	2 year	3 year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Joppa	29	0	54.7	16.2	58.1	77.3	44.0	60.7	59.8
Mountrail	29	0	52.9	16.8	63.8	72.2	39.6	55.9	58.5
Carpio	30	0	55.4	15.7	52.8	77.0	43.6	60.3	57.8
Grenora	28	0	52.4	16.6	58.4	71.7	41.8	56.8	57.3
Alkabo	27	0	55.5	16.3	60.4	66.3	38.4	52.3	55.0
Divide	29	0	55.3	17.2	58.0	68.1	33.0	50.5	53.0
ND Riveland	31	0	55.3	16.8	--	79.5	43.3	61.4	--
ND Grano	29	0	54.3	17.2	--	76.1	42.0	59.1	--
VT Peak	28	0	56.5	16.0	--	--	42.5	--	--
Trial Mean	28	0	54.5	16.6	58.5	74.2	41.0	--	--
C.V.%	5.6	0	1.1	3.4	3.8	6.9	10.9	--	--
LSD 5%	2	NS	0.8	0.8	3.3	7.4	6.5	--	--
LSD 10%	2	NS	0.7	0.7	2.6	6.2	5.4	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.5 million PLS/A and harvested on August 8.
Previous Crop: 2014 = wheat, 2015 = soy, 2016 = wheat.
Tillage: no-till
Soil Type: Williams loam
Note: The 2017 trial sustained severe drought and moderate hail injury.

NDSU North Central Research Extension Center
2017 Durum Yield Results from the North Central Region **Combined Means**

Variety	Sawfly	Lodging	Plant Height	Test Weight	Protein	Grain Yield 2015	2016	2017	-- Average -- 2 Year	3 Year
	0-9*	0-9*	inches	lbs/bu	%	bu/A				
Mountrail	2	0	26	56.8	14.4	61.5	73.8	42.4	58.1	59.2
Divide	2	0	28	57.5	14.7	58.8	71.0	37.6	54.3	55.8
Alkabo	4	0	26	58.0	14.1	58.6	71.3	41.9	56.6	57.3
Carpio	2	0	28	57.6	13.7	53.8	73.3	48.4	60.9	58.5
Grenora	2	0	26	56.2	14.6	58.8	72.2	44.6	58.4	58.5
Joppa	2	0	27	57.7	14.1	58.1	76.0	45.8	60.9	59.9
ND Grano	4	0	27	57.2	14.8	--	74.7	46.4	60.5	--
ND Riveland	3	0	29	58.2	14.7	--	78.0	51.1	64.6	--
VT Peak	2	0	27	58.1	14.6	--	--	43.4	--	--
# of Trials	1	3	4	4	4	5	5	4	9	14

**Lodging: 0 = none, 9 = lying flat on the ground.*

Locations: 2017: Garrison, Mohall, Rugby, Wilton
Locations: 2015 & 2016: Minot, Garrison, Mohall, Rugby, Wilton

NDSU North Central Research Extension Center, Minot
2017 Barley Variety Trial at Minot

Variety	Days to Head	Plant Height	% Plump	% Thin	Test Weight	Protein	Grain Yield 2015	2016	2017	----Average---- 2 Year	3 Year
	DAP[1]	inches	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Quest	64	26	79	1	48.7	14.0	74.7	101.1	74.4	87.7	83.4
Innovation	64	23	88	0	48.4	13.1	86.7	94.0	60.3	77.2	80.3
Celebration	65	24	83	1	46.2	12.9	84.1	92.4	60.0	76.2	78.8
Lacey	63	24	86	1	48.7	13.3	87.0	84.8	64.0	74.4	78.6
Stellar-ND	64	23	88	0	47.4	13.1	75.6	96.0	62.2	79.1	77.9
Tradition	65	26	88	0	48.6	13.0	73.3	89.0	68.6	78.8	77.0
2 Row Types							--	--	--	--	--
ND Genesis	69	24	97	0	49.4	11.3	108.8	110.4	77.6	94.0	98.9
CDC Meredith	73	21	88	1	46.5	12.9	96.5	110.2	73.7	92.0	93.5
Conlon	63	23	96	0	49.3	12.9	95.0	93.5	72.0	82.7	86.8
Pinnacle	65	22	97	0	50.2	12.0	79.6	104.7	72.4	88.5	85.6
LCS Odyssey	74	22	95	0	47.3	11.9	--	126.1	71.3	98.7	--
Sirish	73	20	90	1	48.0	13.1	--	118.4	77.7	98.1	--
LCS Genie	76	22	94	0	49.2	11.9	--	107.5	82.7	95.1	--
ABI Balster	75	24	93	0	48.6	12.7	--	108.6	79.6	94.1	--
AAC Synergy	76	22	96	0	48.2	12.9	--	114.5	69.2	91.8	--
ABI Growler	76	22	94	0	46.7	13.1	--	103.8	70.8	87.3	--
Explorer	67	20	88	0	49.1	12.6	--	--	72.6	--	--
Trial Mean	67	23	91	1	48.4	12.6	86.5	103.3	70.8	--	--
C.V.%	3.8	5.1	2.7	81	1.6	5.7	5.7	7.4	7.6	--	--
LSD 5%	4	2	4	NS	1.2	1.2	7.0	12.7	8.8	--	--
LSD 10%	3	2	3	NS	1.0	1.0	5.8	10.6	7.4	--	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 22 with a seeding rate of 1 million PLS/A and harvested on July 31.
Previous Crop: 2014 = flax, 2015 = soybean, 2016 = canola.
Tillage: Transitional no-till (2nd year)
Soil Type: Williams Loam

NDSU North Central Research Extension Center
2017 Barley Variety Trial at Mohall
Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

							Grain Yield				
	Plant		%	%	Test					Average	
Variety	Height	Lodging	Plump	Thin	Weight	Protein	2015	2016	2017	2 yr	3 yr
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Tradition	29	0	95	5	45.9	12.1	79.3	83.9	105.6	94.8	89.6
Lacey	29	0	95	5	46.6	11.6	70.1	71.4	92.5	81.9	78.0
2 Row Types											
ND Genesis	27	0	97	3	47.0	10.3	78.4	96.4	107.0	101.7	93.9
CDC Meredith	28	0	88	11	45.2	10.6	--	81.6	107.2	94.4	--
AAC Synergy	28	0	96	4	47.4	10.8	--	--	113.3	--	--
LCS Odyssey	24	0	96	3	46.4	9.7	--	--	110.8	--	--
Trial Mean	27	0	94	5	46.4	10.9	78.4	82.3	106.1	--	--
C.V.%	5.8	0	2.6	42	1.3	5.2	6.2	6.4	5.4	--	--
LSD 5%	2	NS	4	3	0.9	0.8	6.2	7.8	8.6	--	--
LSD 10%	2	NS	3	3	0.7	0.7	4.9	6.5	7.1	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1 million PLS/A and harvested on August 17.
Previous Crop: 2014 = oat, 2015 = sunflower, 2016 = durum.
Tillage: minimum till
Soil Type: Barnes loam

2017 Barley Variety Trial at Rugby
Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

							Grain Yield				
	Plant		%	%	Test					Average	
Variety	Height	Lodging	Plump	Thin	Weight	Protein	2015	2016	2017	2 yr	3 yr
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Tradition	26	0	89	10	46.1	14.9	87.4	95.8	86.2	91.0	89.8
Lacey	27	0	92	8	46.6	15.2	77.9	87.0	72.5	79.7	79.1
2 Row Types							--	--	--	--	--
ND Genesis	27	0	95	5	46.2	13.4	80.0	88.1	102.0	95.1	90.0
CDC Meredith	27	0	90	9	45.0	15.1	--	86.8	90.6	88.7	--
LCS Odyssey	23	0	97	3	46.6	14.5	--	--	90.2	--	--
AAC Synergy	26	0	95	5	46.5	16.0	--	--	83.9	--	--
Trial Mean	26	0	93	6	46.2	14.8	79.6	86.8	87.5	--	--
C.V.%	4.6	0	2.0	27	1.4	3.4	3.5	4.7	4.4	--	--
LSD 5%	2	NS	3	3	1.2	0.9	4.1	6.1	7.0	--	--
LSD 10%	2	NS	3	3	1.0	0.7	3.3	5.0	5.7	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 30 with a seeding rate of 1 million PLS/A and harvested on August 17.
Previous Crop: 2014 = soybean, 2015 = wheat, 2016 = field pea.
Tillage System: minimum till
Soil Type: Gardena silt loam

NDSU North Central Research Extension Center
2017 Barley Variety Trial at Garrison
Cooperator: Mike Zimmerman, Garrison

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2015	2016	2017	Average 2 yr	3 yr
	inches	0-9*	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types											
Tradition	21	0	61	39	41.6	15.5	57.6	89.8	41.3	65.6	62.9
Lacey	18	0	72	28	42.9	15.8	57.1	87.5	35.5	61.5	60.0
2 Row Types											
ND Genesis	20	0	76	24	42.6	14.3	76.2	94.5	40.0	67.3	70.2
CDC Meredith	21	0	66	34	40.5	15.4	--	96.3	43.4	69.9	--
LCS Odyssey	19	0	77	23	43.1	14.8	--	--	44.2	--	--
AAC Synergy	20	0	69	31	42.7	15.6	--	--	40.6	--	--
Trial Mean	20	0	70	30	42.2	15.2	61.4	91.8	40.8	--	--
C.V.%	6.5	0	13.7	32	3.6	5.0	6.2	5.9	17.1	--	--
LSD 5%	2	NS	NS	NS	2.3	NS	5.8	8.1	NS	--	--
LSD 10%	2	NS	NS	NS	1.9	0.9	4.7	6.7	NS	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1 million PLS/A and harvested on August 8.
Previous Crop: 2014 = barley, 2015 = canola, 2016 = barley.
Tillage: no-till
Soil Type: Williams Bowbells loam
Note: The 2017 trial sustained severe drought.

2017 Barley Variety Trial at Wilton
Cooperator: Rod Binstock, Baldwin

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2015	2016	2017	Average 2 yr	3 yr
	inches	0-9*	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types											
Tradition	25	0	51	48	42.1	17.7	95.6	89.8	58.9	74.3	81.4
Lacey	24	0	46	53	40.7	18.1	94.8	87.5	38.5	63.0	73.6
2 Row Types											
ND Genesis	24	0	74	25	43.9	15.9	96.9	94.5	34.4	64.5	75.3
CDC Meredith	26	0	45	54	39.4	18.8	--	96.3	53.7	75.0	--
AAC Synergy	24	0	45	54	41.7	19.2	--	--	54.0	--	--
LCS Odyssey	23	0	62	36	42.9	17.8	--	--	42.3	--	--
Trial Mean	24	0	54	45	41.8	17.9	--	--	47.0	--	--
C.V.%	6.3	0	19.4	23	3.1	4.6	--	--	12.9	--	--
LSD 5%	2	NS	16	16	1.9	1.2	--	--	9.1	--	--
LSD 10%	2	NS	13	13	1.6	1.0	--	--	7.5	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.5 million PLS/A and harvested on August 8.
Previous Crop: 2014 = wheat, 2015 = soy, 2016 = wheat.
Tillage: no-till
Soil Type: Williams loam
Note: The 2017 trial sustained severe drought and moderate hail injury.

NDSU North Central Research Extension Center
2017 Barley Yield Results from the North Central Region **Combined Means**

Variety	Days to Head	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2015	2016	2017	----Average---- 2 Year	3 Year
		inches	0-9*	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types												
Tradition	65	25	0	76.8	20.4	44.9	14.6	78.6	89.7	72.1	80.9	80.1
Lacey	63	24	0	77.9	18.8	45.1	14.8	77.4	83.6	60.6	72.1	73.9
2 Row Types												
ND Genesis	69	24	0	87.7	11.4	45.8	13.0	88.1	96.8	72.2	84.5	85.7
CDC Meredith	73	25	0	75.5	21.7	43.3	14.6	--	94.2	73.7	84.0	--
AAC Synergy	76	24	0	80.1	18.9	45.3	14.9	--	--	72.2	--	--
LCS Odyssey	74	22	0	85.5	13.0	45.3	13.8	--	--	71.7	--	--
# of Trials	1	5	5	5	5	5	5					

**Lodging: 0 = none, 9 = lying flat on the ground.*

Locations: Minot, Garrison, Mohall, Rugby, Wilton

NDSU North Central Research Extension Center, Minot
2017 Barley Cover Crop Trial at Minot

Cover Crop Treatment	Cover Planting Date	Days to Head	Plant Height	Lodging	% Plump	% Thin	1000 KWT	Test Weight	Protein	Grain Yield	Cover Crop Biomass[3]
		DAP[1]	inches	0-9[2]	>6/64	<5/64	g	lbs/bu	%	bu/A	lbs/A
No cover crop	--	54	26	0	97	3	52	47.6	10.9	77.0	68
CC planted with barley	May 10	54	24	0	97	3	54	46.6	11.0	67.5	1483
CC broadcast over 4 leaf barley	May 30	54	24	0	98	2	55	48.3	11.1	70.1	562
CC broadcast over early headed barley	July 5	54	24	0	98	2	53	47.9	11.0	69.0	439
CC planted after barley harvest	Aug. 15	54	25	0	97	2	52	47.6	10.8	70.1	216
CC planted with barley + flax post-harvest	5/10 + 8/15	54	26	0	97	3	53	47.9	10.8	68.1	850
Trial Mean		54	25	0	97	2	53	47.6	10.9	70.3	1078
C.V.%		0.0	4.9	0	0.9	27	42.0	2.9	4.1	8.5	66.0
LSD 0.05		NS	NS	NS	NS	NS	NS	NS	NS	NS	1073

[1] *DAP = Days after planting.*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

[3] *Cover crop biomass includes all green plant material (cover crop + volunteer barley) at the end of the growing season. Data was collected on Oct. 13 and reported on a dry weight basis.*

NS = no statistical difference between cover crop treatments.

Barley Variety: Tradition
Planting Date: May 10
Harvest Date: August 14
Cover Crop Mix: turnip, radish, lentil and flax
Previous Crop: soy
Tillage System: No-till
Soil Type: Williams Loam
Note: Excellent sub-soil moisture but little in-season rainfall hindered germination of broadcast cover crops.

NDSU North Central Research Extension Center, Minot
Barley Seeding Rates in North Central North Dakota

Variety Comparisons

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield
	inches	0-9[a]	>6/64	<5/64	lbs/bu	%	bu/A
Tradition	30	2	92	1	48.2	12.9	96.6
ND Genesis	30	1	96	0	48.6	11.1	98.1
LSD 0.05	NS	NS	1	NS	0.3	0.2	NS

Seeding Rate Comparisons

Seeding Rate	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield	Gross Return*
1000's/A	inches	0-9[a]	>6/64	<5/64	lbs/bu	%	bu/A	$/A
500	30	2	93	0	48.4	12.1	92.7	341
750	30	2	94	0	48.4	12.1	95.5	348
1000	30	1	94	0	48.6	11.9	99.2	359
1250	30	1	94	0	48.4	12.0	101.8	366
LSD 0.05	NS	NS	NS	NS	NS	NS	3.7	--

Variety by Seeding Rate Interactions

Variety	Seeding Rate	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield
	1000's/A	inches	0-9[a]	>6/64	<5/64	lbs/bu	%	bu/A
Tradition	500	30	2	91	1	48.1	12.9	92.7
	750	30	1	92	0	48.0	13.0	93.7
	1000	30	2	93	0	48.7	12.8	99.5
	1250	30	2	92	1	48.2	12.9	100.3
ND Genesis	500	31	1	96	0	48.6	11.2	92.7
	750	31	2	96	0	48.8	11.2	97.4
	1000	30	1	96	0	48.5	11.0	99.0
	1250	30	1	96	0	48.6	11.1	103.3
LSD 0.05		NS	NS	NS	NS	NS	NS	NS

[a] *Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between treatments.
**Gross Return: Yield x $3.75 contract price - $0.125/lb certified seed cost.*

***Summary**: Barley malting varieties Tradition and ND Genesis were seeded at four different seeding rates and at four locations, Mohall, Rugby, Garrison and Wilton. Variety by seeding rate interactions were not detected, meaning that these variables should be treated independently. Statistically significant differences between varieties were observed for % plump, test weight and protein. Statistically significant differences between seeding rates were observed only for grain yield, with the 500,000 seeding rate producing less grain yield than higher rates. There were no statistical differences for any characteristic between 750k, 1000k or 1250k seeding rates. The optimum seeding rate was 750,000 seeds per acre but the highest gross return was achieved at 1,250,000 seeds per acre.*

NDSU North Central Research Extension Center
2017 Oat Variety Trial at Minot

					Grain Yield				
	Days to	Plant		Test				---- Average ----	
Variety	Head	Height	Lodging	Weight	2015	2016	2017	2 year	3 year
	[1]DAP	inches	[2]0-9	lb/bu	----------	----------	bu/A ----------	----------	----------
CDC Minstrel	68	31	0	35.8	137.2	159.6	143.3	151.4	146.7
AC Pinnacle	68	33	1	38.7	139.4	150.9	144.7	147.8	145.0
Beach	64	31	3	40.3	149.0	144.4	140.1	142.3	144.5
HiFi	64	35	2	38.3	128.6	154.2	147.7	150.9	143.5
CDC Dancer	63	31	5	36.1	143.2	140.1	126.6	133.3	136.6
Deon	65	33	0	37.4	102.7	164.8	136.3	150.5	134.6
Stallion	63	27	1	37.2	134.7	121.6	139.5	130.5	131.9
Leggett	70	33	0	36.2	118.8	136.8	132.8	134.8	129.5
Hytest	65	31	2	39.2	118.9	144.2	122.9	133.6	128.7
Souris	65	31	2	38.6	98.2	145.7	141.4	143.6	128.4
Jury	64	32	1	38.3	118.5	136.4	127.8	132.1	127.6
Otana	66	33	3	38.3	109.8	136.3	136.3	136.3	127.5
Killdeer	64	31	1	37.4	120.4	129.2	130.9	130.1	126.8
Newburg	64	30	4	38.6	108.2	147.6	119.7	133.6	125.2
Rockford	67	37	3	39.2	107.9	128.7	119.0	123.8	118.5
Paul	70	35	0	42.5	121.0	102.0	99.9	100.9	107.6
Hayden	64	35	0	40.2	--	160.6	151.0	155.8	--
CS Camden	65	30	0	34.8	--	--	144.0	--	--
GM423	67	32	2	33.6	--	--	132.8	--	--
Trial Mean	66	32	2	37.9	123.9	145.7	139.7	--	--
C.V.%	2.5	62	88	4.0	9.9	8.8	7.9	--	--
LSD 5%	3	3	2	2.5	17.2	21.0	18.0	--	--
LSD 10%	2	3	1	2.1	14.3	17.5	15.0	--	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.*

Planted on April 22 with a seeding rate of 1 million PLS/A and harvested on August 14.

Previous Crop: 2014 & 2015 = flax, 2016 = soy.

Soil Type: Williams Loam

Tillage: No-till

2017 Hard Red Winter Wheat Variety Trial at Minot
NDSU North Central Research Extension Center

Variety	Spring Stand	Heading Date	Plant Height	Test Weight	Grain Protein	Grain Yield				
						2014	2016	2017	2 yr avg	3 yr avg
	%	June	inches	lbs/bu	%	bushels per acre				
Peregrine	99	4	35	62.4	11.6	69.7	83.5	89.8	86.6	81.0
WB Matlock	88	3	29	61.0	13.0	73.9	85.7	67.7	76.7	75.8
Ideal	99	3	28	62.0	11.4	68.4	84.0	74.9	79.5	75.8
SY Wolf	98	3	32	62.1	13.2	62.8	77.1	87.3	82.2	75.7
Flourish	96	2	30	61.6	13.9	64.8	78.2	80.6	79.4	74.5
AC Broadview	93	3	25	60.8	12.5	72.5	85.6	59.8	72.7	72.6
Accipiter	96	4	28	61.9	12.4	68.9	79.2	67.0	73.1	71.7
Lyman	96	1	29	61.2	13.9	68.2	81.5	64.2	72.9	71.3
Decade	95	3	27	61.7	13.6	69.8	82.0	59.7	70.9	70.5
Moats	91	4	29	60.8	12.8	64.7	79.3	63.6	71.5	69.2
Jerry	93	3	30	60.1	13.2	64.3	84.9	57.9	71.4	69.0
Redfield	99	2	27	61.4	12.9	62.6	75.0	64.6	69.8	67.4
AC Emerson	85	3	29	60.3	14.0	65.8	82.2	53.9	68.1	67.3
AC Gateway	95	3	26	60.9	13.9	59.0	83.7	54.3	69.0	65.7
Overland	86	2	27	60.4	13.6	61.1	68.3	57.6	63.0	62.3
SY Monument	98	2	30	61.4	12.0	--	85.4	84.1	84.7	--
CDC Chase	94	3	33	61.5	12.8	--	82.1	84.6	83.3	--
Loma	86	5	26	60.0	14.7	--	95.2	62.8	79.0	--
Ruth	98	2	31	62.4	13.7	--	75.8	78.1	76.9	--
WB4614	96	4	28	61.2	13.6	--	73.9	72.0	73.0	--
Northern	83	4	27	60.7	13.4	--	84.6	54.6	69.6	--
SY Sunrise	95	1	27	62.3	12.9	--	68.2	55.0	61.6	--
Keldin	98	4	31	61.7	12.1	--	--	79.7	--	--
Oahe	96	1	34	61.8	12.7	--	--	77.3	--	--
Overland-FHB1	98	2	32	61.4	13.5	--	--	60.3	--	--
Trial Mean	94	3	29	61.2	13.1	64.7	77.9	68.7	--	--
C.V. %	8.3	30	4.9	0.7	5.4	11.6	5.3	7.9	--	--
LSD 5%	NS	1	2	0.7	1.2	8.5	5.9	8.9	--	--
LSD 10%	NS	1	2	0.6	1.0	7.1	4.9	7.4	--	--

Planting Date: September 20, 2016
Harvest Date: July 24, 2017
Seeding Rate: 1.3 million live seeds / acre
Previous Crop: 2013 = prevent plant, 2015 = spring wheat, 2016 = canola
Tillage: Transitional No-till (2nd year)
Soil Type: Williams loam

North Dakota winter rye variety descriptions.

Variety	Origin[1]	Year Released	Height	Straw Strength	Days to Flowering	Seed Color	Seed Size	Test Weight	Winter Hardiness
AC Hazlet	Canada	2006	47	Good	152	Bl-grn.	Small	High	Good
Aroostok	USDA	1981	48	Fair	148	NA[2]	Small	High	V.good
Brasetto	KWS Germany	2008	45	V.good	150	NA	Large	High	Good
Dacold	ND	1989	47	Good[3]	150	Bl-grn.	Med.	Low	Good
Hancock	WI	1979	47	Good	151	Tan	Large	High	Fair[4]
ND Dylan	ND	2016	49	Good	147	Blue	Med.	High	V. good
Rymin	MN	1973	42	V.good	151	Grn-gray	Large	High	Fair[4]
Spooner	WI	1993	49	V.good	151	Tan	Large	High	Good
Wheeler	MI	1971	47	Fair	152	NA	Large	Low	Good

[1] ND = North Dakota State University; WI = University of Wisconsin; MN = University of Minnesota; MI = Michigan State University.

[2] NA = not available.

[3] Under certain environments, lodging has been observed.

[4] Varieties with fair winter hardiness should not be seeded in bare soil.

NDSU Publication A1049 -17 (Revised) at https://www.ag.ndsu.edu/publications

NDSU North Central Research Extension Center
2017 Winter Rye Variety Trial at Minot

Variety	Winter Survival	Heading Date	Plant Height	Lodging	Test Weight	--------- Grain Yield --------- 2016	2017	2 yr avg
	%	May	inches	0-9*	lbs/bu	---- bushels per acre ----		
ND Dylan	98	28	46	0	53.6	95.2	72.6	83.9
Rymin	99	28	41	0	55.3	77.5	76.9	77.2
Hancock	99	24	46	0	54.4	78.3	69.6	74.0
Dacold	99	6/1	42	0	52.5	80.6	58.8	69.7
Spooner	96	26	46	0	54.0	79.3	57.5	68.4
Aroostok	93	22	46	0	53.8	59.0	40.9	49.9
Brasetto	99	27	37	0	53.0	--	93.1	--
Hazlet	99	28	41	0	55.1	--	76.7	--
Wheeler	96	31	46	0	50.2	--	41.0	--
Trial Mean	98	26	44	0	53.6	77.5	63.9	--
C.V. %	1.5	6.3	4.2	0.0	1.2	4.6	8.4	--
LSD 5%	3	3	3	NS	1.1	5.2	9.1	--
LSD 10%	2	2	3	NS	0.9	4.3	7.5	--

**Lodging: 0 = none, 9 = lying flat on the ground.*

Planting Date: September 20, 2016
Harvest Date: July 23, 2017
Seeding Rate: 1 million live seeds / acre
Previous Crop: 2015 = spring wheat, 2016 = canola
Tillage System: No-till
Soil Type: Williams loam

NDSU North Central Research Extension Center
2017 Grain Corn Variety Trial at Minot

Company / Brand	Hybrid	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield 2015[a]	2016[b]	2016[c]	2017[d]	Avg.[e]	2 yr Avg	3 yr Avg
		days	DAP*	inches	%	lbs/bu	bushels per acre						
Integra	3537	85	92	35	19	53.3	163	169	130	143	136	147	151
Integra	3142	81	90	33	15	56.4	121	160	102	143	122	135	131
Integra	2803	78	92	32	17	54.7	122	140	134	116	125	130	128
Integra	3236	82	88	35	17	56.8	--	175	111	135	123	140	--
Integra	2601	76	86	32	17	58.2	--	--	--	120	--	--	--
Legacy Seeds	L-2314 VT2P	83	88	37	16	54.9	150	147	152	164	158	154	153
Legacy Seeds	LS-1814 VT2P	79	88	34	16	56.2	129	167	135	143	139	148	144
Legacy Seeds	L-2213 VT2P	81	87	33	15	56.4	143	135	145	139	142	140	141
Legacy Seeds	L-2245 VT2P	82	89	35	17	56.0	--	184	130	140	135	151	--
Legacy Seeds	L-2546 RR2	79	88	39	18	55.6	--	--	--	158	--	--	--
Legacy Seeds	L-2516 VT2P	84	89	32	19	54.9	--	--	--	152	--	--	--
Legacy Seeds	L-1943 VT2P	81	86	34	17	57.5	--	--	--	146	--	--	--
Legacy Seeds	L-1713 RR2	78	88	35	16	55.5	--	--	--	141	--	--	--
Legacy Seeds	LS-1746 VT2P	78	88	32	15	57.9	--	--	--	125	--	--	--
Legacy Seeds	L-2436 3220	84	90	32	17	55.9	--	--	--	120	--	--	--
Proseed	1480	80	88	33	15	56.0	133	127	141	142	141	137	136
Proseed	1280	80	86	30	18	57.3	120	146	114	138	126	133	129
Proseed	1377	77	89	34	17	56.9	--	--	--	138	--	--	--
Proseed	1378	78	93	34	16	55.8	--	--	--	131	--	--	--
Proseed	1278	78	89	32	16	52.7	--	--	--	125	--	--	--
NuTech/G2 Genetics	5F-379	79	86	33	18	56.9	135	185	155	137	146	159	153
NuTech/G2 Genetics	5F-775	75	85	34	15	54.5	131	153	137	139	138	143	140
NuTech	5N-183	83	89	34	19	57.3	167	202	187	138	162	176	173
NuTech	5N-886	86	88	32	18	55.6	--	173	157	144	150	158	118
NuTech	5GN-8484	84	89	30	15	54.2	--	181	158	121	140	153	--
NuTech	X5GN-8105	81	89	30	18	56.0	--	--	--	143	--	--	--
NuTech	X5FN-8504	85	88	33	19	54.7	--	--	--	138	--	--	--
NuTech	X5GN-7603	76	89	32	14	55.5	--	--	--	112	--	--	--

2017 Grain Corn Variety Trial at Minot—Continued

Company / Brand	Hybrid	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield 2015[a]	2016[b]	2016[c]	2017[d]	Avg.[e]	2 yr Avg	3 yr Avg
		days	DAP*	inches	%	lbs/bu	bushels per acre						
Hefty Seed	H3302	83	88	35	16	54.7	--	174	147	146	146	156	--
Hefty Seed	H3202	82	89	36	18	56.2	--	155	136	130	133	140	--
Hefty Seed	H2802	78	90	35	15	55.6	--	170	123	121	122	138	--
Hefty Seed	H2602	76	85	34	17	57.5	--	167	109	129	119	135	--
Hefty Seed	H3502	85	90	34	19	54.5	--	--	--	138	--	--	--
Hefty Seed	H2512	75	84	30	16	58.0	--	--	--	127	--	--	--
Peterson Farms Seed	71D83	81	87	32	17	55.4	132	142	139	117	128	133	133
Peterson Farms Seed	71C80	80	87	29	19	57.6	--	150	119	122	121	130	--
Peterson Farms Seed	78A82	82	91	32	17	56.1	--	--	--	136	--	--	--
Thunder Seed	6882 VT2P	82	90	33	18	58.1	--	--	--	131	--	--	--
Thunder Seed	4383 VT2P	83	88	34	17	57.7	--	--	--	129	--	--	--
Thunder Seed	4578 RR	78	89	35	16	56.9	--	--	--	126	--	--	--
Thunder Seed	6880 VT2P	80	88	31	15	56.8	--	--	--	125	--	--	--
Thunder Seed	6874 VT2P	74	84	32	15	58.4	--	--	--	120	--	--	--
Trial Mean			88	33	17	56.1	132	163	135	134	--	--	--
C.V.%			1.4	5.1	10.7	2.3	8.2	12.6	10.8	8.1	--	--	--
LSD 5%			2	3	3	2.1	15	33	24	18	--	--	--
LSD 10%			2	2	2	1.8	13	28	20	15	--	--	--

**DAP = Days after planting.*

[a] 2015 No-till planted on May 5 into soy stubble and harvested on October 17.

[b] 2016 Strip till planted on May 20 into soy stubble and harvested on October 20.

[c] 2016 No-till twin rows planted on June 3 into soy stubble and harvested on November 9.

[d] 2017 Minimum till twin rows planted on May 12 into barley stubble and harvested on October 21.

[e] Average of 2016 and 2017 twin row trials.

Planting Rate: 28,000 seeds/A

Soil Type: Williams Loam

Note: Test weights and yields are adjusted to 15.5% moisture.

NDSU North Central Research Extension Center
2017 Silage Corn Variety Trial at Minot

Company	Hybrid	Relative Maturity	Days to Silk	Harvest Moisture	Crude Protein	TDN	Yield 65% moist
			DAP[1]	%	%	%	tons/A
Legacy Seeds	L-1943 VT2P	77	76	53	8.1	76	14.78
Legacy Seeds	L-3115 VT2P	87	83	61	6.6	70	17.70
Legacy Seeds	L-3335 GT	89	81	63	6.7	72	17.76
Legacy Seeds	L-3567 RR2	95	87	65	7.4	70	16.77
Legacy Seeds	L-4545 RR2	100	84	63	6.6	70	19.45
Legacy Seeds	L-4567 RR2	100	87	65	6.5	70	18.51
Legacy Seeds	L-4665 RR2	101	88	67	6.4	72	17.89
Legacy Seeds	L-5467 RR2	104	88	65	5.8	70	17.60
Wensman	W80827VT2RIB	82	74	51	7.2	73	16.29
Wensman	W80845VT2Pro	84	75	51	6.8	73	18.85
Wensman	W80874VT2RIB	87	75	59	6.5	72	18.84
Wensman	W80883GTCBLL	88	75	55	7.8	74	15.79
Dairyland Seed	HiDF-3197RA	97	90	66	6.8	71	18.50
Dairyland Seed	HiDF-3099RA	99	84	65	7.8	73	19.13
Dairyland Seed	HiDF-3702-9	102	92	71	6.3	70	16.15
Proseed	STS92	92	81	63	7.8	74	18.85
Proseed	STS 103	103	89	68	7.6	72	15.58
Proseed	STS 104	104	88	68	6.4	70	18.13
Proseed	STS 105	105	82	64	6.5	73	17.14
grain ck	NuTech 5N-886	86	77	51	7.5	73	16.65
Trial Mean			83	62	7.0	72	17.52
C.V.%			1.7	3.3	--	--	9.9
LSD 5%			2	3	--	--	2.88
LSD 10%			2	3	--	--	2.40

[1] *DAP = days after planting*

Planting Date: May 12
Harvest Date: September 18
Plant Population: 28,000 plants/A
Row Spacing: 30"
Tillage: Strip till
Previous Crop: durum
Soil Type: Williams Loam

NDSU North Central Research Extension Center
2016 Strip-till Corn Trial at Minot

This trial was designed to compare corn that was planted into strip till and no-till. Each systems was planted on May 3 (early) and on May 20 (late) with three different maturing hybrids.

Planting System	Planting Date	Hybrid	Days to Emerge	Silking Date	Ear Height	Test Weight	Harvest Moisture	Grain Yield
			DAP[a]	July	inches	lbs/bu	%	bu/A
No-till	early	76 RM	13	23	37	58.5	19	152
		80 RM	13	28	38	58.5	19	164
		85 RM	13	21	34	58.9	18	137
	late	76 RM	12	28	38	60.9	22	144
		80 RM	12	28	41	58.2	20	144
		85 RM	12	28	38	55.9	20	147
Strip till	early	76 RM	15	20	36	61.1	20	142
		80 RM	15	23	37	57.9	19	153
		85 RM	15	23	35	55.7	18	147
	late	76 RM	9	28	36	60.7	21	137
		80 RM	9	29	37	58.7	20	152
		85 RM	9	26	39	56.7	21	148
C.V.%			0.0	0.2	6.3	2.5	8.3	7.8
LSD 5%			1	2	3	2.2	1	17

Tillage System Comparisons

Tillage System	Days to Emerge	Silking Date	Ear Height	Test Weight	Harvest Moisture	Grain Yield
	DAP[a]	July	inches	lbs/bu	%	bu/A
No Till	12	25	38	58.5	20	148
Strip Till	12	25	37	58.7	20	146
LSD 5%	NS	NS	NS	NS	NS	NS

Planting Date Comparisons

Planting Date	Days to Emerge	Silking Date	Ear Height	Test Weight	Harvest Moisture	Grain Yield
	DAP[a]	July	inches	lbs/bu	%	bu/A
Early	14	22	36	58.6	19	149
Late	10	28	38	58.5	21	146
LSD 5%	1	1	NS	NS	NS	NS

Hybrid Comparisons

Hybrid	Days to Emerge	Silking Date	Ear Height	Test Weight	Harvest Moisture	Grain Yield
	DAP[a]	July	inches	lbs/bu	%	bu/A
76 RM	12	24	36	60.4	20	140
80 RM	12	26	38	58.3	19	153
85 RM	12	25	38	56.9	20	149
LSD 5%	NS	NS	NS	2.0	NS	NS

2016 Strip-till Corn Trial at Minot—Continued

Tillage System by Planting Date Comparisons

Tillage System	Planting Date	Days to Emerge	Silking Date	Ear Height	Test Weight	Harvest Moisture	Grain Yield
		DAP[a]	July	inches	lbs/bu	%	bu/A
No Till	early	13	24	36	58.6	19	151
	late	12	28	39	58.3	21	145
Strip Till	early	15	22	36	58.2	19	147
	late	9	28	37	58.7	21	146
LSD 5%		1	1	NS	NS	NS	NS

[a] *DAP = days after planting.* *NS= no statistical difference.*

Planting Rate: 28,000 seeds/A *Row Spacing: 30"*

Harvest Date: October 28 *Previous Crop: spring wheat* *Soil Type: Williams Loam*

Summary: 10 inch wide tillage strips were made into standing spring wheat stubble in the fall of 2015 with a Dawn Equipment Pluribus system. Land adjacent to the strip till was left undisturbed as no-till. Three different maturing hybrids were planted on May 3 (early) and on May 20 (late). There was no statistical difference between tillage systems for any agronomic characteristic, seed quality or grain yield. Planting date had an influence on emergence and silking date but did not influence ear height, test weight, harvest moisture or grain yield in this trial. The only statistically significant difference between hybrids was for test weight. There were no meaningful interactions between tillage system, planting date and hybrid in this trial. Based on this single year, there does not appear to be any advantage of one tillage system over the other, however, additional trials will need to be

NDSU North Central Research Extension Center
2017 Corn Row Configuration and Planting Rate Trial at Minot

Hybrid	Row Configuration	Planting Rate	Harvest Stand	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield
RM		Seeds/A	plants/A	DAP*	inches	%	lbs/bu	bu/A
76 day	30" Single	22k	18,188	70	31	17.3	57.4	87.5
		30k	23,232	72	34	19.5	59.0	92.1
		35k	20,328	70	34	16.4	57.0	95.7
	30" Twin	22k	20,099	72	33	17.4	56.6	90.7
		30k	23,843	70	36	16.7	57.3	123.4
		35k	27,817	70	34	17.9	58.2	106.1
85 day	30" Single	22k	15,896	75	33	17.9	55.7	97.0
		30k	20,022	74	34	17.1	53.8	111.2
		35k	18,035	75	34	15.5	53.0	108.7
	30" Twin	22k	19,105	76	32	16.9	55.0	100.8
		30k	20,939	76	34	17.5	54.7	115.9
		35k	23,156	74	34	19.6	56.8	110.6
C.V.%			7.6	2.3	4.3	6.7	2.2	8.6
LSD 5%			5,397	3	2	2.0	2.1	15.1

Combined Means-Row Configuration

Row Configuration	Harvest Stand	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield
	plants/A	DAP*	inches	%	lbs/bu	bu/A
30" Single	19,284	73	34	17.3	56.0	98.7
30" Twin	22,493	73	34	17.7	56.4	107.9
LSD 5%	2,083	NS	NS	NS	NS	8.5

Combined Means-Seeding Rate

Planting Rate	Harvest Stand	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield
Seeds/A	plants/A	DAP*	inches	%	lbs/bu	bu/A
22k	18,322	73	32	17.4	56.2	94.0
30k	22,009	73	35	17.7	56.2	110.6
35k	22,334	72	34	17.3	56.2	105.3
LSD 5%	2,478	NS	1	NS	NS	9.5

2017 Corn Row Configuration and Planting Rate Trial at Minot—Continued

Combined Means-Hybrid

Hybrid	Harvest Stand	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield
RM	plants/A	DAP*	inches	%	lbs/bu	bu/A
76 day	22,251	71	34	17.5	57.6	99.2
85 day	19,526	75	34	17.4	54.8	107.4
LSD 5%	2,170	1	NS	NS	1.0	NS

**Days after planting.*

NS = No statistical difference between treatments.

Planting Date: May 15 *Harvest Date: October 21*

Previous Crop: Barley *Tillage System: Minimum Till*

Soil Type: Williams Loam

Note: The trial sustained severe drought (3.6" of precip Jan 1 - July 30)

Summary: The main objective of this trial was to compare single row and twin row configurations. The trial was planted with a SRES small plot planter using Great Plains no-till openers and Monosem seed singulation meters. The twin row configuration consists of 10 inch paired rows that are planted on 30 inch centers. This configuration is common with some crops such as peanut and with corn in some regions of the country. A twin row configuration allows for more plant to plant growing space within each row compared to traditional single rows. This trial also included 3 planting rates of two hybrids with distinctly different maturities. Comparisons between row configurations showed twin rows producing significantly higher plant stands which translated into 9 more bushels of yield on average. 30k and 35k planting rates produced similar plant stands and grain yields. As would be expected, there were differences between the hybrids however, grain yields were statistically similar. In conclusion, this trial does show benefits of using a twin row configuration however, the trial will need to be repeated in order to validate this conclusions.

NDSU North Central Research Extension Center
2017 Roundup Ready Canola Variety Trial

Company	Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Oil Content	Seed Yield				
							2015	2016	2017	2 year	3 year
		DAP[1]	days	DAP[1]	inches	%	pounds / acre				
Cargill	V12-3	47	21	83	43	49.0	--	3156	2213	2684	--
Cargill	V14-1	48	20	85	46	49.6	--	--	1751	--	--
Dekalb	DKL 35-23	43	24	83	42	51.2	--	--	2445	--	--
Dekalb	DKL 70-10	44	21	82	43	50.1	2551	3603	1826	2714	2660
Dekalb	DKL 71-14BL	43	22	83	41	52.5	--	3017	2399	2708	--
Dekalb	DKL 75-42CR	47	19	84	42	51.3	--	--	1654	--	--
Proseed	300 Mag	44	23	83	42	49.8	2640	3604	1734	2669	2659
Proseed	PS 5000	44	22	81	47	50.0	2519	2779	1832	2306	2377
Dyna-Gro	DG 533G	47	21	84	45	50.3	--	3923	2209	3066	--
Integra	7150	43	22	82	41	52.4	2027	3245	2011	2628	2428
Integra	7257	43	22	81	42	45.6	--	3400	1901	2650	--
CROPLAN	HyCLASS 930	42	23	83	41	52.4	2338	3234	2423	2828	2665
CROPLAN	HyCLASS 955	43	22	83	41	52.4	2270	3111	2298	2704	2560
CROPLAN	HyCLASS 970	44	23	87	46	52.0	2657	3684	2147	2916	2830
Mycogen	1022 RR	50	20	93	48	49.4	1720	2629	1643	2136	1997
Mycogen	1024 RR	49	20	91	44	51.6	--	--	1972	--	--
BrettYoung	6074 RR	49	21	88	45	48.4	2444	3106	1932	2519	2494
BrettYoung	6076 CR	46	23	88	51	48.9	--	--	1811	--	--
BrettYoung	6080 RR	46	22	87	44	49.2	--	3435	1915	2675	--
BrettYoung	6086 CR	49	20	87	46	49.3	--	--	1747	--	--
Star	Star 402	44	22	84	44	53.9	--	--	1985	--	--
Canterra	CS2000	47	21	82	48	47.1	--	3162	1548	2355	--
Canterra	CS2100	45	22	85	45	49.6	--	3515	1919	2717	--
Canterra	CS2300	48	22	87	49	51.2	--	--	1933	--	--
Trial Mean		46	21	85	45	49.9	2324	3148	1883	--	--
C.V.%		2.4	4.8	2.2	4.4	3.5	7.2	9.5	18.0	--	--
LSD 5%		2	2	3	3	2.8	234	487	551	--	--
LSD 10%		2	1	3	3	2.4	196	407	460	--	--

[1] *DAP = Days after planting.*

Trial was planted on May 2 with a seeding rate of 8 lbs/A and harvested on August 19.

Previous Crop: 2014 = durum, 2015 = HRSW, 2016 = soy.

Tillage: Minimum till.

Soil Type: Williams Loam

Oil content and seed yields are adjusted to 8.5% moisture.

NDSU North Central Research Extension Center
2017 Non-Roundup Ready Canola Variety Trial

Company	Variety	Herbicide System	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Oil Content	Seed Yield				
								2015	2016	2017	2 year	3 year
			DAP*	days	DAP*	inches	%	lbs/A				
Mycogen	2020 CL	CL	49	16	86	40	48.5	2095	2497	1172	1834	1921
Mycogen	2022 CL	CL	49	15	87	37	47.8	--	2624	1511	2068	--
Mycogen	2024 CL	CL	47	17	86	38	49.5	--	--	1395	--	--
Cargill	V32-1CL	CL	46	17	81	39	45.3	--	--	1875	--	--
Dyna-Gro	DG 200CL	CL	49	17	83	39	47.1	--	3390	1492	2441	--
Canterra	CS2200CL	CL	48	17	79	38	49.0	--	2747	1541	2144	--
Bayer	InVigor L140P	LL	46	18	78	39	46.3	2412	3133	1876	2504	2474
Bayer	InVigor L252	LL	47	16	78	40	48.9	2141	2939	1911	2425	2330
Bayer	InVigor L233P	LL	45	18	78	40	46.5	--	3198	1977	2588	--
Bayer	InVigor L230	LL	45	18	78	40	46.6	--	2986	2012	2499	--
Bayer	InVigor L241C	LL	49	16	79	42	44.9	--	--	1530	--	--
Cibus	C5507	SU	48	15	79	39	47.1	--	2601	1585	2093	--
Cibus	C5522	SU	47	16	80	37	48.9	--	2439	1347	1893	--
Cibus	C5513	SU	48	16	78	36	47.8	--	2301	1031	1666	--
RR Check	DKL 70-10	RR	45	18	77	38	47.3	--	--	1926	--	--
Trial Mean			47	17	81	38	46.9	2033	2611	1488	--	--
C.V.%			1.3	3.9	1.3	5.6	2.5	6.2	7.5	15.2	--	--
LSD 5%			1	1	2	4	1.9	150	326	372	--	--
LSD 10%			1	1	1	3	1.6	183	271	310	--	--

**DAP = Days after planting.*

Trial was planted on May 10 with a seeding rate of 8 lbs/A and harvested on August 21.

Previous Crop: 2014, 2015 & 2016 = soybean

Soil Type: Williams Loam

Tillage: Conventional Till

Oil content and seed yields are adjusted to 8.5% moisture.

NDSU North Central Research Extension Center
2017 Canola Seed Singulation Trial at Minot

Variety	Seeding Rate		Harvest Stand	Days to 10% Blm	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Seed Yield
	seeds/A	lbs/A	plants/A	DAP1	DAP1	DAP1	inches	%	lbs/A
HyClass 955	50k	0.48	83,893	42	21	89	30	46.0	442
HyClass 955	100k	0.96	113,579	42	18	85	33	45.1	595
HyClass 955	150k	2.0	94,219	43	20	86	35	45.0	610
HyClass 955	200k	1.9	103,253	42	16	85	34	46.6	615
HyClass 955	400k	3.8	126,485	42	16	82	34	48.1	1104
HyClass 970	50k	0.65	83,893	45	24	89	34	43.7	490
HyClass 970	100k	1.3	95,509	45	24	92	34	43.5	795
HyClass 970	150k	1.4	118,741	46	22	91	34	44.4	588
HyClass 970	200k	2.6	127,776	45	24	92	35	43.5	995
HyClass 970	400k	5.2	130,357	45	24	92	35	42.7	951
Trial Mean			108,900	44	21	88	34	44.9	719
C.V.%			22.5	1.9	11.7	3.8	4.3	2.6	14.9
LSD 0.05			NS	1	4	6	3	2.0	184

Combined Means

Seeding Rate	Harvest Stand	Days to 10% Blm	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Seed Yield
seeds/A	plants/A	DAP[1]	DAP[1]	DAP[1]	inches	%	lbs/A
50k	83,893	44	23	89	32	44.9	466
100k	104,544	44	21	89	33	44.3	695
150k	106,480	44	21	89	34	44.7	599
200k	115,515	44	20	89	35	45.1	805
400k	128,421	43	20	87	34	45.4	1028
LSD 0.05	26,136	NS	NS	NS	2	NS	180

[1] *DAP = Days after planting.* *NS = no statistical difference between seeding rates.*

Planting Date: May 17 *Harvest Date: September 3*
Row Spacing: 15" *Previous Crop: Spring wheat*
Tillage System: Transitional No-till (2nd year) *Soil Type: Williams Loam*
Note: The trial was grown under severe drought (3.6" of precip from January 1 - June 30).

Summary: The trial was planted with Great Plains no-till openers using Monosem seed singulation meters. The month of May was very dry and probably hindered germination and seedling establishment. The trial also sustained severe drought throughout the growing season which limited growth and yield. The harvested plant stand indicated that lower seeding rates were over seeded and that all of the seeding rates produced statistically similar plant stands at harvest. Despite these similarities, there was a direct correlation between harvest stand and yield, with the 400k seeding rate producing the most plants, resulting in significantly higher yields than the lower rates. Additional trials will need to be conducted in order to make firm conclusions on this technology.

NDSU North Central Research Extension Center
2016 Seeding Rate Interactions with Row Spacing in Canola at Minot

Interactions

Row Spacing	Seeding Rate	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Yield
	pls/A	plants/A	DAP*	days	DAP*	inches	%	lbs/A
10"	200,000	216,348	42	26	90	39	42.6	1155
	400,000	236,676	43	25	87	42	45.7	1030
	600,000	341,220	41	25	85	40	47.5	1314
	800,000	409,464	41	24	85	38	46.5	1260
20"	200,000	211,992	42	26	88	39	47.8	1592
	400,000	402,204	42	24	82	38	47.6	1762
	600,000	557,568	41	23	78	39	49.1	1688
	800,000	618,552	41	21	79	38	47.8	1714
30"	200,000	204,732	42	26	86	39	47.9	1008
Twin Row	400,000	339,768	42	24	81	35	49.2	834
	600,000	386,232	42	24	78	36	48.4	846
	800,000	438,504	42	23	80	37	48.3	1067
C.V. %		10.8	1.3	5.7	4.0	8.2	3.6	20.4
LSD 5%		56,673	1	2	5	NS	2.4	374

Row Spacing Comparisons

Row Spacing	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Yield
	plants/A	DAP*	days	DAP*	inches	%	lbs/A
10"	300,927	42	25	86	40	45.6	1190
20"	447,579	41	23	82	38	48.1	1689
30" Twin	342,309	42	24	81	37	48.4	939
LSD 5%	89,846	NS	1	3	2	1.4	179

Seeding Rate Comparisons

Seeding Rate	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Yield
pls/A	plants/A	DAP*	days	DAP*	inches	%	lbs/A
200,000	211,024	42	26	88	39	46.1	1252
400,000	326,216	42	24	83	38	47.5	1209
600,000	428,340	41	24	80	38	48.4	1283
800,000	488,840	41	23	81	38	47.5	1347
LSD 5%	72,184	1	1	3	NS	NS	NS

**DAP = days after planting.* *NS= no statistical difference.*
Planting Date: June 7 *Harvest Date: September 17*
Variety = HyCLASS 930 *Soil Type: Williams Loam*
Previous Crop: spring wheat *Tillage: Minimum Till*

Summary: Canola is know for it's flexible growth habit with respect to plant populations. Many population studie have shown the remarkable ability of this crop to produce good yields with minimal stands. In the past, seeding rate recommendations were often based on crop stand competition for weed control and on the ability of seedin equipment to effectively meter this small seed. Today's modern metering systems and seeding equipment are capable of applying precise seeding rates and in some instances, seed singulation. This trial was sown with a SRES precision planter using adjustable row units and seed singulation technologies. This initial study showed statistical difference between seeding rates for yield, oil content or plant height. Lighter stands tended to have a extended flowering period and delayed maturity. Row spacing comparisons showed statistically significant differences for stand establishment, duration of flowering, days to mature, plant height, oil content and yield. Stand establishment was significantly higher with the 20" rows compared to the 10" and 30" twin rows, resulting a significantly higher yield. In general, the relatively low yields of this trial were probably a result of the late seeding date. Results of this study should be viewed with caution and not as recommendations for production practices without further verification.

Safflower Variety Descriptions

Variety	Origin[1]	PVP[2]	Hull Type[3]	Oil Type[4]	Irrigated Yield[5]	Dryland Yield[5]	Test Weight[5]	Oil[5]	Maturity	Tolerance[6] Alt	Tolerance[6] BB
Cardinal	MSU/NDSU	yes	N	high lino	v good	v good	high	fair	med	T	MT
Finch	MSU/NDSU	no	N	lino	good	v good	v high	fair	m early	MS	T
Hybrid 1601	STI	yes	STP	high oleic	v good	v good	med	good	m late	MT	MT
Hybrid 9049	STI	yes	N	high oleic	v good	v good	v high	fair	med	MT	MT
MonDak	MSU/NDSU	yes	N	high oleic	good	v good	high	fair	m early	T	MT
Montola 2000	MSU/NDSU	yes	N	high oleic	m good	good	med	good	early	MS	MS
Montola 2001	MSU/NDSU	yes	STP	high oleic	good	fair	med	good	med	MT	MT
Montola 2003	MSU/NDSU	yes	N	high oleic	v good	v good	m high	good	m early	MT	MT
Montola 2004	MSU/NDSU	yes	N	high oleic	good	good	m high	good	m early	MS	MT
Morlin	MSU/NDSU	yes	STP	high lino	v good	good	med	good	m late	T	T
Nutrasaff	MSU/NDSU	yes	RED	lino	good	good	med	high	med	T	MT

[1] MSU = Montana State University, NDSU = North Dakota State University, STI = Safflower Technologies International

[2] PVP = Plant Variety Protection. "yes" indicates the variety is protected and the seed may be sold for planting purposes only as a class of certified seed (Title V option).

[3] STP = striped, N = normal, RED = reduced.

[4] Lino = linoleic.

[5] Relative ratings of yield, test weight and oil will vary under conditions of moderate-severe disease infestation.

[6] Alt = Alternaria leaf spot disease, BB = bacterial blight, S = susceptible, MS = moderately susceptible, MT = moderately tolerant, T = tolerant.

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2017 Safflower Variety Trial at Minot

Variety	Days to Bloom	Plant Height	Test Weight	Oil Content	Seed Yield 2015	Seed Yield 2016	Seed Yield 2017	Seed Yield 2 year	Seed Yield 3 year
	DAP[1]	inches	lbs/bu	%	pounds / acre				
Linoleic Types									
Cardinal	74	21	42.3	36.1	2185	2228	2165	2197	2193
Finch	74	22	42.7	38.3	2085	2378	2074	2226	2179
NutraSaff	76	23	36.7	46.0	1834	1545	2257	1901	1879
Oleic Types									
Hybrid 1601	73	24	38.8	37.4	2969	3213	3020	3117	3067
Montola 2003	76	21	40.1	37.8	2685	2194	2120	2157	2333
MonDak	74	24	41.5	36.8	2074	2269	2582	2426	2308
Trial Mean	74	22	40.8	37.2	2265	2305	2435	--	--
C.V.%	1.5	6.2	1.6	1.2	6.7	5.1	12.4	--	--
LSD 5%	2	2	1.1	0.8	220	175	528	--	--
LSD 10%	2	2	0.9	0.6	183	144	433	--	--

[1] Days after Planting

Planting Date: May 5 *Harvest Date: September 12*

Seeding Rate: 300,000 PLS/A (approx. 20 lbs/A)

Previous Crop: 2014 = soybean, 2015 = hrsw, 2016 = soybean

Tillage System: Minimum till *Soil Type: Williams Loam*

NDSU North Central Research Extension Center
2017 Flax Variety Trial at Minot

Variety	10% Bloom	Plant Height	Test Weight	Oil Content	Seed Yield 2014	2016	2017	----Average---- 2 year	3 year
	DAP[1]	inches	lbs/bu	%	bushels per acre				
CDC Glas	52	22	54.9	47.1	26.2	26.9	23.6	25.3	25.6
Carter	51	21	56.1	46.0	25.5	30.7	20.3	25.5	25.5
Webster	50	22	55.6	47.0	23.9	28.0	20.5	24.3	24.1
CDC Neela	50	20	55.2	47.7	21.8	25.6	23.5	24.5	23.6
Gold ND	52	22	54.5	47.4	26.0	27.6	16.3	22.0	23.3
CDC Sanctuary	52	22	55.1	45.7	24.8	26.7	18.2	22.5	23.2
Nekoma	50	19	55.2	46.6	22.1	28.8	17.9	23.3	22.9
Rahab 94	51	19	55.1	46.1	25.2	25.3	17.6	21.5	22.7
CDC Sorrel	52	23	55.3	46.1	24.9	26.6	16.6	21.6	22.7
Prairie Thunder	51	21	55.6	46.0	23.6	26.1	17.8	22.0	22.5
CDC Bethune	50	22	55.7	46.8	23.8	24.3	19.3	21.8	22.5
York	47	21	55.8	47.2	23.7	23.9	18.7	21.3	22.1
Bison	49	22	56.1	46.2	25.3	21.6	18.9	20.3	21.9
Shape	48	20	55.6	46.6	24.2	22.4	16.9	19.7	21.2
Omega	49	19	56.8	46.2	22.3	23.8	16.1	19.9	20.7
Prairie Grande	48	20	55.6	46.6	21.5	21.7	17.5	19.6	20.2
Pembina	50	20	56.1	45.4	15.1	26.3	17.5	21.9	19.6
Prairie Sapphire	50	21	55.1	47.8	20.1	15.7	19.3	17.5	18.4
Prairie Blue	50	22	55.7	46.9	18.4	20.1	16.1	18.1	18.2
CDC Plava	50	20	56.0	46.1	--	19.2	17.3	18.3	--
Trial Mean	51	21	55.6	46.5	23.6	24.9	18.4	--	--
C.V.%	2.2	6.6	1.4	2.0	12.5	12.4	15.3	--	--
LSD 5%	2	2	1.2	1.4	4.1	5.0	4.6	--	--
LSD 10%	1	2	1.0	1.2	3.4	4.2	3.8	--	--

[1] *Days after Planting*

Planting Date: May 9
Harvest Date: August 19
Seeding Rate: 2.5 million PLS/A
Previous Crop: 2013 & 2015 = spring wheat, 2016 = soybean
Soil Type: Williams Loam
Tillage: minimum-till

NDSU North Central Research Extension Center
Nitrogen Fertility and Fungicide Interactions in Flax at Minot

This trial was designed to investigate interactions between levels of nitrogen fertility and the timing of fungicide applications on flax in order to define optimal production practices with these inputs. Below are combined data from 2014, 2015 and 2016 growing seasons.

Interactions

N Fert Levels	Fungicide Timing[b]	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
lbs N / A[a]		DAP[c]	DAP[c]	inches	lbs/bu	%	bu/A	$[d]
25	untreated	53	92	25	52.8	42.8	18.3	119
	w / herb	53	93	25	52.8	43.5	19.1	107
	10% blm	53	92	24	53.4	43.8	19.9	113
	100% blm	53	93	25	53.4	43.4	20.4	116
75	untreated	53	94	26	53.7	43.5	21.1	121
	w / herb	53	93	26	53.7	43.3	23.6	121
	10% blm	53	92	26	53.3	43.5	25.1	132
	100% blm	53	93	25	53.3	43.2	28.0	152
125	untreated	54	93	27	53.5	42.7	24.4	127
	w / herb	53	92	26	53.7	42.5	24.2	108
	10% blm	53	93	26	53.3	42.8	25.6	118
	100% blm	53	92	26	52.9	42.8	26.0	120
LSD 5%		NS	NS	NS	NS	NS	NS	--

Nitrogen Fertility Comparisons

N Fert Levels	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
lbs N / A[a]	DAP[c]	DAP[c]	inches	lbs/bu	%	bu/A	$[d]
25	53	94	25	53.1	43.4	19.4	127
75	53	95	26	53.5	43.4	24.4	145
125	53	97	26	53.3	42.7	25.1	132
LSD 5%	NS	1	NS	NS	NS	1.8	--

Timing of Fungicide Application Comparisons

Fungicide Timing[b]	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
	DAP[c]	DAP[c]	inches	lbs/bu	%	bu/A	$[d]
Untreated	53	96	26	53.4	43.0	21.4	150
w/herb	53	96	26	53.4	43.1	22.2	138
10% blm	53	95	26	53.4	43.4	23.5	147
100% blm	53	96	26	53.2	43.1	24.8	156
LSD 5%	NS	NS	NS	NS	NS	1.9	--

[a] Nitrogen fertility levels = residual soil N + lbs of actual N applied as urea (46-0-0) prior to planting (2014 and 2015) or applied in a mid-row band at planting (2016).

[b] Fungicide Timing: 8 oz/A Headline (2014) or 8 oz/A Priaxor (2015 and 2016) applied with a grass herbicide, at 10% bloom and at full bloom. *[c] DAP = days after planting.*

[d] Gross Return on Investment: $7/bu market price - N @ $0.35/lb and $17.84/A fungicide. This figure does not include indirect costs such as application, labor and equiment costs.

NS= no statistical difference. *Previous Crop: spring wheat*

Variety = York *Planting Rate: 40 lbs/A* *Soil Type: Williams Loam*

Conclusions: Interactions between nitrogen fertility levels and the timing of fungicide applications were not detected and therefore these inputs should be managed independently. The 125 lb/A N rate prolonged crop maturity and did not significantly enhance yield over the 75 lb/A rate. Fungicide applications during flowering enhanced yield compared to the untreated. Disease was not observed. Basic calculations on optimal return on investment would indicate the use of 75 lbs of N and a fungicide application when the crop is in full bloom.

NDSU North Central Research Extension Center
Nitrogen Fertility and Seeding Rate Interactions in Flax at Minot

This trial was designed to investigate interactions between levels of nitrogen fertility and seeding rates of flax in order to define optimal production practices with these inputs. Below are combined data from 2014, 2015 and 2016 growing seasons.

Interactions

N Fert Levels	Seeding Rate	Seeding Rate	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
lbs N / A[a]	million	lbs/A	DAP[b]	DAP[c]	inches	lbs/bu	%	bu/A	$[c]
25	2	25	53	94	25	52.2	42.9	17.1	105
	2.5	32	54	95	24	51.4	42.8	19.3	119
	3	38	53	94	25	52.0	43.4	20.5	126
	3.5	44	53	95	25	51.5	43.9	16.9	99
75	2	25	53	94	26	52.3	43.6	22.3	124
	2.5	32	53	94	26	52.0	42.1	20.5	110
	3	38	53	94	26	50.9	43.5	23.9	132
	3.5	44	53	94	27	51.7	43.8	22.5	121
125	2	25	53	95	26	51.8	43.1	20.9	97
	2.5	32	53	96	26	51.7	43.4	26.9	137
	3	38	53	96	26	51.7	42.7	24.9	122
	3.5	44	53	95	26	51.6	42.9	25.9	127
LSD 5%	--	--	NS	NS	NS	NS	NS	NS	--

Nitrogen Fertility Comparisons

N Fert Levels	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
lbs N / A[a]	DAP[b]	DAP[b]	inches	lbs/bu	%	bu/A	$[c]
25	53	94	25	51.8	43.2	18.5	121
75	53	94	26	51.7	43.3	22.3	130
125	53	95	26	51.7	43.0	24.6	128
LSD 5%	NS	NS	NS	NS	NS	1.1	--

Seeding Rate Comparisons

Seeding Rate	Seeding Rate	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Grain Yield	Return on Investment
million	lbs/A	DAP[b]	DAP[c]	inches	lbs/bu	%	bu/A	$[c]
2	25	53	94	26	52.1	43.2	20.2	136
2.5	32	53	95	26	51.7	42.8	22.4	150
3	38	53	95	26	51.5	43.2	23.0	152
3.5	44	53	95	26	51.6	43.5	21.7	142
LSD 5%	--	NS	NS	NS	NS	NS	2.1	--

[a] *Nitrogen fertility levels = residual soil N + lbs of actual N applied as urea (46-0-0) prior to planting (2014 and 2015) or applied in a mid-row band at planting (2016).*

[b] *DAP = days after planting.*

[c] *Gross Return on Investment: $7/bu market price - N @ $0.35/lb and $0.23/lb certified seed. This figure does not include indirect costs such as application, labor and equiment costs.*

NS= no statistical difference.

Variety = York *Previous Crop: spring wheat* *Soil Type: Williams Loam*

Conclusions: Interactions between nitrogen fertility levels and seeding rates were not detected and therefore these inputs should be managed independently. Nitrogen fertility and seeding rates did not impact agronomic or seed quality characteristics. Yields increased with increasing levels of N fertility, however, the optimal return on investment was at 75 lbs of N. Statistically significant differences between seeding rates were observed with 2.5 and 3 million seeds per acre producing higher yields than the 2 million seeding rate. These rates also produced the optimal return on investment.

NDSU North Central Research Extension Center, Minot
2017 Oil Type Sunflower Variety Trial at Minot

Company/Brand	Hybrid	Days to Bloom	Days to Mature	Plant Height	Oil	Test Weight	Yield 2016	Yield 2017	Yield Avg.
		DAP*	DAP*	inches	%	lbs/bu	lbs/A	lbs/A	lbs/A
Proseed	E-31 CL	61	115	65	39.0	29.9	3694	2723	3209
Proseed	12G25 CL	62	118	58	47.2	35.2	3361	2888	3124
Proseed	E-73 CL	63	113	61	38.9	28.8	--	2627	--
Proseed	E-362436	61	115	65	42.5	34.1	--	2387	--
Proseed	E-72	65	115	69	41.7	31.9	--	2291	--
Proseed	50016CL	61	117	62	43.3	31.5	--	2142	--
Proseed	E-71 CL	61	113	66	36.5	28.4	--	2117	--
Proseed	E-21 CL	61	116	67	37.4	31.1	--	2034	--
CROPLAN	568 CL HO	64	119	60	45.5	34.0	--	3595	--
CROPLAN	7917 CL HO	62	119	62	44.9	34.0	--	3419	--
CROPLAN	7717 CL HO	61	114	61	42.7	33.4	--	3225	--
CROPLAN	545 CL	64	114	58	44.7	34.0	--	3144	--
CROPLAN	458 E HO	60	114	68	43.3	32.9	--	2941	--
CROPLAN	3732	64	119	63	47.6	35.3	--	2813	--
CROPLAN	455 E HO	61	117	63	45.2	34.3	--	2744	--
CROPLAN	3845 HO	63	119	64	47.7	34.2	--	2490	--
CROPLAN	549 CL	58	111	66	42.5	34.2	--	2302	--
CROPLAN	432 E	58	112	63	39.9	33.7	--	2247	--
Mycogen Seeds	8H449CLDM	61	119	65	47.8	35.8	2969	3167	3068
Mycogen Seeds	8D310CL	62	120	62	36.0	32.2	3259	2382	2821
Mycogen Seeds	8H270CLDM	57	113	59	46.1	33.5	2707	2649	2678
Dyna-Gro Seed	XH72H61CL	57	113	56	48.1	34.1	--	2984	--
Dyna-Gro Seed	XH72H47CL	63	118	61	47.3	32.9	--	2735	--
Dyna-Gro Seed	XH71N33CL	57	112	58	45.3	35.2	--	2000	--
Dyna-Gro Seed	HX71H11CL	58	113	57	44.0	34.3	--	1834	--
Nuseed	Badger DMR	58	113	70	35.7	32.5	3142	3816	3479
Nuseed	Talon	60	112	59	42.4	31.8	3176	2802	2989
Nuseed	Falcon	62	120	60	43.8	35.0	3083	2792	2938
Nuseed	N4HM354	58	113	56	43.9	34.2	3278	2567	2922
Nuseed	Cobalt II	59	112	55	44.7	33.9	3212	2534	2873
Nuseed	N5LM307	58	112	56	39.1	30.9	2825	2901	2863
Nuseed	Hornet	65	119	60	47.7	33.1	3054	2651	2853
Nuseed	Camaro II	62	113	59	44.4	34.4	2409	3000	2705
SunOpta	4415HO/CLP/DM	60	113	64	42.8	32.5	--	2519	--
SunOpta	4425CL	61	115	64	39.0	32.9	--	2467	--
SunOpta	4421CL	63	117	62	37.5	31.8	--	2085	--
Thunder Seed	42H94	62	114	64	45.8	33.0	--	2992	--
Thunder Seed	11N94	61	114	63	45.7	34.3	--	2895	--
Thunder Seed	12N92	59	113	58	46.7	33.7	--	2347	--
Thunder Seed	35H92	58	113	58	44.0	35.1	--	2332	--
Long Term Check	Hybrid 894	61	113	55	42.2	32.7	2636	1818	2227
Early Matur Check	Honeycomb NS	54	109	47	40.1	30.0	1821	1212	1517
Med Matur Check	8N270CLDM	58	112	54	44.5	32.7	2474	2231	2352
Late Matur Ckeck	559CL	65	120	59	43.9	34.2	2863	1782	2323
Trial Mean		61	115	51	43.2	33.1	2890	2582	--
C.V.%		2.2	1.3	4.4	2.8	2.3	11.3	16.5	--
LSD 5%		2	2	4	2.0	1.2	538	693	--
LSD 10%		2	2	4	1.7	1.0	449	580	--

**DAP = Days after planting.*

Planting Date: May 23 *Harvest Date: October 22* *Row Spracing: 30"*

Planting Population: 28,000 plants/A *Tillage: Minimum Till*

Previous Crop: 2015 = spring wheat, 2016 = barley *Soil Type: Williams loam*

Note: Yield, test weight and oil content are adjusted to 10% moisture.

NDSU North Central Research Extension Center, Minot
2017 Non-Oil Type Sunflower Variety Trial at Minot

Company/Brand	Hybrid	Days to 50% Flower DAP[1]	Days to Maturity DAP[1]	Plant Height inches	Test Weight lb/bu	Seed Over Screen >22/64 %--	Seed Over Screen >20/64 %--	Seed Over Screen >18/64 %--	Seed Yield 2015 lbs/A	Seed Yield 2016 lbs/A	Seed Yield 2017 lbs/A	Seed Yield Average 2 year lbs/A	Seed Yield Average 3 year lbs/A
Nuseed	Panther DMR	57	111	57	25.1	11	29	95	1456	1934	2650	2292	2013
SunOpta	9549	59	119	55	22.0	2	7	99	--	--	3732	--	--
SunOpta	9553	59	118	69	23.5	1	3	99	--	--	3510	--	--
SunOpta	9510	60	118	68	26.0	5	14	94	--	--	3081	--	--
SunOpta	9524	61	113	60	25.7	2	6	99	--	--	2478	--	--
Royal Hybrid	RH609CLP	60	113	64	24.8	2	6	97	1673	1888	2644	2266	2068
Long Term Check	Hybrid 924	60	120	62	25.8	4	14	95	1747	1332	2034	1683	1704
Trial Mean		59	115	61	24.5	4	11	97	1749	1789	2658	--	--
C.V.%		1.7	1.2	3.0	2.9	93	102	2.8	12.3	6.7	7.6	--	--
LSD 5%		2	2	3	1.2	NS	NS	NS	310	219	238	--	--
LSD 10%		1	2	3	1.0	NS	NS	4	258	178	196	--	--

[1] *Days After Planting*

Planting Date: May 23
Plant Population: 18,000 plants/A
Row Spacing: 30"
Harvest Date: October 22
Previous Crop: 2014 = spring wheat, 2015 = soybean, 2016 = barley
Tillage: Minimum till
Soil Type: Williams Loam

NDSU North Central Research Extension Center, Minot
2017 Confection Sunflower Row Spacing and Seeding Rate Trial at Minot

Row Spacing	Seeding Rate	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Seed Over Screen >22/64	>20/64	>18/64	Test Weight	Yield
	seeds/A	plants/A	DAP*	DAP*	inches	%	----------%----------			lbs/bu	lbs/A
30"	15,000	8,483	66	111	55	16.3	25	45	48	27.5	2478
	20,000	6,649	66	112	58	17.7	24	42	45	27.1	1856
	25,000	13,450	66	111	61	14.4	26	41	47	27.2	2427
	30,000	14,749	66	111	60	13.4	28	42	48	26.9	2958
Twin Row	15,000	12,151	65	111	58	14.0	25	40	46	27.0	2483
	20,000	13,832	65	112	60	16.6	26	41	47	28.2	2297
	25,000	16,278	66	111	61	15.5	27	40	46	27.2	2379
	30,000	20,175	65	111	61	13.5	29	38	48	27.7	3003
15"	15,000	11,157	66	111	58	13.9	27	44	49	26.3	2048
	20,000	14,214	66	111	60	14.5	25	39	44	26.3	2863
	25,000	15,055	66	111	59	17.1	26	40	47	27.7	2661
	30,000	19,335	66	111	57	17.0	29	43	50	28.6	3116
C.V.%		8.8	1.5	0.8	4.9	13.9	7.4	7.5	8.2	3.7	12.7
LSD 5%		2,056	NS	NS	NS	NS	NS	NS	NS	NS	546

Combined Means-Row Spacing

Row Spacing	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Seed >22/64	>20/64	>18/64	Test Weight	Yield
	plants/A	DAP*	DAP*	inches	%	----------%----------			lbs/bu	lbs/A
30"	10,833	66	111	58	15.4	26	42	47	27.2	2430
Twin Row	15,609	65	112	60	14.9	27	40	47	27.5	2541
15"	14,940	66	111	59	15.6	27	41	47	27.2	2672
LSD 5%	2,056	NS	NS	NS	NS	NS	NS	NS	NS	NS

Combined Means-Seeding Rates

Seeding Rate	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Seed >22/64	>20/64	>18/64	Test Weight	Yield
seeds/A	plants/A	DAP*	DAP*	inches	%	-----%----------			lbs/bu	lbs/A
15,000	10,597	66	111	57	14.7	26	43	48	26.9	2336
20,000	11,565	66	112	59	16.3	25	41	45	27.2	2339
25,000	14,928	66	111	60	15.7	26	40	47	27.4	2489
30,000	18,086	66	111	59	14.6	29	41	49	27.7	3026
LSD 5%	2,644	NS	NS	NS	NS	2	NS	NS	NS	367

**Days after planting.* *NS = No statistical difference between treatments.*

Planting Date: May 23 *Hybrid: Nuseed Panther DMR*
Harvest Date: October 22 *Previous Crop: Barley*
Soil Type: Williams Loam *Test weight and yield are adjusted to 10% moisture.*

Summary: The main objective of this trial was to compare 15", 30" and twin row configurations using four different seeding rates. The trial was planted with a SRES small plot planter using Great Plains no-till openers and Monosem seed singulation meters. The twin row configuration consists of 10 inch paired rows that are planted on 30-inch centers. This row configuration is common with some crops such as peanut and corn in some regions of the country. 15" and twin row configurations allow for more plant to plant growing space within each row compared to 30" single rows. Average plant stands were significantly higher for twin rows and 15" rows compared to 30" rows however, these differences did not correlate with yield. There was no statistical difference between row configurations for any agronomic, seed quality or yield characteristic. The highest seeding rate produced a significantly higher yield and percentage of large seeds than the other seeding rates. In conclusion, sunflowers are known for their ability to flex their head size according to plant populations and growing conditions, and this ability was expressed in this trial. Higher plant populations produce smaller heads, but not smaller seed size, which dry down more quickly and tend to have less lodging. This trial showed a yield advantage from planting at higher seeding rates without lowering seed quality. There was no advantage or disadvantage to using any particular row configuration. This trial will need to be repeated in order to verify these findings.

NDSU North Central Research Extension Center, Minot
2017 Oil Sunflower Row Spacing and Seeding Rate Trial at Minot

Row Spacing	Seeding Rate	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Oil Content	Test Weight	Yield
	seeds/A	plants/A	DAP*	DAP*	inches	%	%	lbs/bu	lbs/A
30"	15,000	11,616	55	112	70	14.6	39.4	30.1	2662
	20,000	14,672	54	112	70	15.0	39.2	30.2	2626
	25,000	15,896	59	112	69	12.8	43.6	31.3	2777
	30,000	15,361	62	111	69	13.3	42.5	31.0	2814
30" Twin Row	15,000	13,527	62	112	69	14.8	41.9	31.0	2463
	20,000	15,819	63	112	69	14.1	42.0	31.6	2856
	25,000	18,494	64	111	69	11.8	43.4	30.7	2526
	30,000	20,404	65	112	69	12.7	43.6	31.5	3099
15"	15,000	11,998	58	112	70	15.1	41.5	30.7	2774
	20,000	15,819	59	113	71	15.3	40.9	30.9	2825
	25,000	20,863	61	112	70	14.6	41.9	31.3	2809
	30,000	21,704	62	112	70	16.0	42.0	31.2	3680
C.V.%		7.4	1.2	0.5	3.0	13.6	3.0	2.5	6.2
LSD 5%		2,028	1	1	NS	NS	2.1	NS	299

Combined Means-Row Spacing

Row Spacing	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Oil Content	Test Weight	Yield
	plants/A	DAP*	DAP*	inches	%	%	lbs/bu	lbs/A
30"	14,195	57	112	70	13.9	41.2	30.7	2720
30" Twin Row	17,061	64	112	69	13.4	42.8	31.2	2736
15"	17,596	60	112	70	15.2	41.6	31.0	3022
LSD 5%	2,726	2	NS	NS	1.6	1.4	NS	271

Combined Means-Seeding Rates

Seeding Rate	Plant Stand	Days to 50% Blm	Days to Mature	Plant Height	Harvest Moisture	Oil Content	Test Weight	Yield
seeds/A	plants/A	DAP*	DAP*	inches	%	%	lbs/bu	lbs/A
15,000	12,380	58	112	70	14.8	40.9	30.6	2633
20,000	15,182	59	112	70	14.8	40.7	30.9	2769
25,000	18,417	62	112	70	13.1	43.0	31.1	2704
30,000	19,156	63	112	69	14.0	42.7	31.2	3198
LSD 5%	2,148	3	NS	NS	NS	1.4	NS	263

**Days after planting.* *NS = No statistical difference between treatments.*

Planting Date: May 23
Harvest Date: October 22
Soil Type: Williams Loam
Hybrid: Croplan 458E
Previous Crop: Barley
Oil, test weight and yield are adjusted to 10% moisture.

2017 Oil Sunflower Row Spacing and Seeding Rate Trial at Minot—Continued

Summary: The main objective of this trial was to compare 15", 30" and 30" twin row configurations using four different seeding rates. The trial was planted with a SRES small plot planter using Great Plains no-till openers and Monosem seed singulation meters. The twin row configuration consists of 10 inch paired rows that are planted on 30 inch centers. This row configuration is common with some crops such as peanut and corn in some regions of the country. 15" and twin row configurations allow for more plant to plant growing space within each row compared to 30" single rows. Average plant stands were significantly higher for twin rows and 15" rows compared to 30" rows however, these differences did not correlate with yield. 15" rows produced significantly higher yields than 30" and twin rows for each seeding rate. Higher seeding rates produced higher oil content but only the 30,000 seeding rate produced higher yields than the other rates. In conclusion, sunflowers are known for their ability to flex their head size according to plant populations and growing conditions, and this ability was expressed in this trial. Higher plant populations produce smaller heads which dry down more quickly and tend to have less lodging. 15" rows provide more evenly spaced plants which utilize moisture and nutrients more effectively and canopy more quickly, providing better weed control. This trial will need to be repeated in order to verify these findings.

NDSU North Central Research Extension Center
2017 Carinata Variety Trial at Minot

Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Lodging	Seed Shatter	----- Seed Yield ----- 2016	2017	Avg.
	DAP[1]	days	DAP[1]	inches	0-9[2]	1-7[3]	---------- lbs/A ----------		
AAC-A120	47	27	90	31	0	1	2449	1465	1957
Invigor L140P canola	46	22	86	39	0	1	3272	1703	2488
HyClass 930 canola	44	23	85	36	0	3	--	1545	
Trial Mean	49	25	91	32	0	2	2392	1368	--
C.V.%	2.0	4.9	1.6	7.6	0	32	5.3	15.4	--
LSD 5%	2	2	2	4	NS	1	229	NS	--
LSD 10%	1	2	2	3	NS	1	186	NS	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.*

[3] Seed Shatter: 1 = none, 7 = completely shattered.

NS = no statistical difference between varieties.

Trial was planted on May 2 with a seeding rate of 8 lbs/A and harvested on August 21.

Previous Crop: 2015 = soybean, 2016 = hrsw.

Tillage System: Transitional No-till (2nd Year)

Soil Type: Williams Loam

NDSU North Central Research Extension Center

2017 Roundup Ready & Extend Soybean Variety Trial at Minot

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating 1-5[a]	Maturity Date Sept	Plant Height inches	Protein %	Oil %	Test Weight lbs/bu	Yield 2015 bushels / acre	Yield 2016 bushels / acre	Yield 2017 bushels / acre	Yield 2 yr bushels / acre	Yield 3 yr bushels / acre
Integra	20215	RR	00.9	2.2	8	33	28.1	17.5	56.4	57.6	48.3	29.4	38.8	45.1
Integra	20126	RR	0.1	2.1	10	30	29.2	18.4	57.1	--	52.6	31.4	42.0	--
Integra	20097	RR	00.9	2.1	6	33	27.6	18.8	56.6	--	50.4	29.8	40.1	--
Integra	20062	RR	00.6	2.2	3	28	29.1	18.1	56.2	--	--	29.6	--	--
Legend Seeds	LS 009X852N	XT	00.9	1.9	8	31	25.8	18.6	56.5	--	--	34.3	--	--
Legend Seeds	LS 01X850	XT	0.1	1.8	8	28	27.8	17.6	57.4	--	--	26.3	--	--
Legend Seeds	LS 005X853	XT	00.5	2.1	6	32	26.1	18.2	57.5	--	--	25.6	--	--
Legend Seeds	LS 006R760N	RR	00.6	1.9	1	24	27.2	18.6	55.1	--	--	22.2	--	--
NDSU	ND17009GT	RR1	00.9	2.7	7	31	28.4	19.0	58.1	43.6	42.6	27.4	35.0	37.9
Legacy Seed	LS-0214 RR2	RR	0.2	2.1	10	33	29.0	18.3	56.4	--	--	38.7	--	--
Legacy Seed	LS-00737N RR2X	XT	00.7	2.0	6	30	28.2	17.2	56.6	--	--	38.5	--	--
Legacy Seed	LS-00538N RR2X	XT	00.5	2.0	8	29	27.6	17.7	57.1	--	--	33.6	--	--
Legacy Seed	LS-0337N RR2X	XT	0.3	2.1	12	30	27.6	18.1	57.5	--	--	33.1	--	--
Legacy Seed	LS-0135 RR2	RR	00.9	1.9	9	36	27.4	18.7	56.3	--	--	32.4	--	--
Legacy Seed	LS-0237 RR2X	XT	0.2	2.3	10	37	27.4	18.1	57.0	--	--	31.7	--	--
Legacy Seed	LS-00937 RR2X	XT	00.9	1.9	8	34	26.8	17.4	56.8	--	--	31.0	--	--
Legacy Seed	LS-00835N RR2	RR	00.8	2.3	9	32	27.2	18.2	56.2	--	--	29.8	--	--
Legacy Seed	LS-00834 RR2	RR	00.7	2.1	1	29	29.3	16.3	56.2	--	--	27.8	--	--
NorthStar Genetics	NS 0081NR2	RR	00.8	2.0	11	33	27.4	18.3	57.1	51.4	55.5	34.0	44.8	47.0
NorthStar Genetics	NS 0072R2	RR	00.7	2.0	11	35	29.5	18.0	56.8	--	46.7	32.7	39.7	--
NorthStar Genetics	NS 0111R2	RR	0.1	1.9	7	33	27.5	18.8	56.5	--	47.7	31.2	39.4	--
NorthStar Genetics	NS 60082NXR2	XT	00.8	1.9	6	28	27.3	17.9	55.9	--	--	30.7	--	--
NorthStar Genetics	NS 60092XR2	XT	00.9	1.7	10	34	28.0	17.2	56.7	--	--	29.4	--	--
NorthStar Genetics	NS 60442NXR2	XT	0.4	2.2	11	27	27.1	18.6	56.7	--	--	26.7	--	--
Proseed	20-30	RR	0.3	2.1	11	32	29.4	17.6	56.5	75.9	51.3	33.5	42.4	53.6
Proseed	30-20	RR	0.2	1.9	8	32	29.2	18.4	55.4	63.8	50.0	34.6	42.3	49.5
Proseed	10-08	RR	00.8	1.9	8	34	27.6	17.9	57.6	59.7	43.1	38.1	40.6	47.0
Proseed	XT 60-09	XT	00.9	2.1	9	35	28.4	17.3	57.1	--	50.7	34.1	42.4	--
Proseed	50-08	RR	00.8	2.4	10	32	29.5	17.5	57.3	--	--	35.0	--	--
Proseed	30-07	RR	00.7	1.9	2	25	27.8	17.0	56.5	--	--	25.8	--	--
Dyna-Gro Seed	S009RY56	RR	00.9	2.1	10	32	27.6	17.9	56.6	58.7	49.0	32.6	40.8	46.8
Dyna-Gro Seed	S03RY36	RR	0.3	1.8	11	30	28.4	18.1	57.1	--	--	45.0	--	--
Dyna-Gro Seed	S009XT68	XT	00.9	2.1	9	35	28.1	17.2	56.4	--	--	34.0	--	--
Hefty Seed	H03x7	XT	0.3	2.1	12	31	30.1	17.6	57.0	--	47.8	33.4	40.6	--
Hefty Seed	H05x7	XT	0.5	2.4	14	31	30.3	17.2	57.5	--	50.1	30.6	40.4	--
Hefty Seed	H009x7	XT	00.9	1.9	7	30	28.9	17.3	56.0	--	45.5	34.6	40.0	--
Hefty Seed	H007x7	XT	00.7	2.1	1	25	30.1	16.8	57.1	--	37.2	34.7	36.0	--
Hefty Seed	H008x8	XT	00.8	2.3	8	32	29.8	17.5	56.9	--	--	39.1	--	--
Hefty Seed	H005x8	XT	00.5	2.1	4	29	28.1	17.5	57.2	--	--	34.2	--	--

2017 Roundup Ready & Extend Soybean Variety Trial at Minot—Continued

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Maturity Date	Plant Height	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield 2017	Yield 2 yr	Yield 3 yr
				1-5[a]	Sept	inches	%	%	lbs/bu	bushels / acre				
Dairyland Seed	DSR-C918/R2Y	RR	00.9	2.2	12	31	27.5	17.7	56.4	63.6	47.7	33.4	40.6	48.2
Dairyland Seed	DSR-0225/R2Y	RR	0.2	2.1	6	32	28.5	18.5	56.0	--	52.2	36.2	44.2	--
Dairyland Seed	DST00-003/R2Y	RR	0.0	2.6	12	33	29.2	17.9	57.0	--	--	47.0	--	--
Wensman Seed	W30085NR2	RR	00.8	2.3	9	31	28.1	17.9	57.2	53.5	44.9	33.7	39.3	44.0
Wensman Seed	W1011RX	XT	0.1	2.3	10	36	27.4	18.3	57.3	--	--	41.8	--	--
Wensman Seed	W3024R2	RR	0.2	2.3	9	30	29.1	17.3	56.6	--	--	39.0	--	--
Wensman Seed	W10063NRX	XT	00.6	2.1	5	30	26.8	17.9	55.8	--	--	38.8	--	--
REA Hybrids	R00727	RR	00.7	1.9	7	34	27.3	17.6	55.2	--	45.2	41.8	43.5	--
REA Hybrids	RX00738	XT	00.7	2.2	7	35	27.4	17.3	56.8	--	--	39.0	--	--
REA Hybrids	RX0228	XT	0.2	1.5	9	34	26.3	18.6	56.3	--	--	34.9	--	--
REA Hybrids	RX0327	XT	0.3	2.2	11	30	27.7	18.4	57.4	--	--	31.7	--	--
Peterson Farms Seed	16R01	RR	0.1	2.1	8	37	27.1	18.5	55.9	47.9	51.4	41.9	46.6	47.1
Peterson Farms Seed	16R008N	RR	00.8	2.0	8	31	26.8	18.3	56.6	55.8	45.4	32.8	39.1	44.7
Peterson Farms Seed	17x009	XT	00.7	2.0	9	33	28.4	17.3	57.1	--	50.7	37.5	44.1	--
Peterson Farms Seed	18X008N	XT	00.8	2.0	6	32	28.6	17.8	57.1	--	--	38.8	--	--
Prairie Brand Seed	PB-0146R2	RR	0.1	2.1	8	31	27.8	18.8	55.8	64.6	51.1	38.6	44.8	51.4
Prairie Brand Seed	PB-00928R2	RR	00.9	2.7	12	30	29.0	18.1	57.2	--	--	40.7	--	--
Prairie Brand Seed	PB-0397R2	RR	0.3	2.1	12	31	26.8	18.2	57.3	--	--	37.2	--	--
Prairie Brand Seed	PB-00856R2	RR	00.9	2.3	10	31	28.1	17.9	56.8	--	--	33.9	--	--
Thunder Seed	Astro	RR	00.8	1.8	12	33	29.3	16.9	57.5	--	--	40.5	--	--
Thunder Seed	3601 R2Y	RR	0.1	2.0	11	36	28.7	18.1	56.0	--	--	39.8	--	--
Thunder Seed	36008 R2YN	RR	00.8	2.3	10	33	29.8	17.5	56.9	--	--	38.8	--	--
Thunder Seed	SB8703	XT	0.3	2.1	11	34	26.1	18.5	57.1	--	--	38.5	--	--
Thunder Seed	SB88007N	XT	00.7	2.2	5	32	27.7	18.0	57.8	--	--	36.3	--	--
Thunder Seed	34006 R2Y	RR	00.6	2.4	9	33	28.4	17.9	55.4	--	--	34.7	--	--
Thunder Seed	SB87009	XT	00.9	1.8	10	30	30.2	16.9	57.2	--	--	34.1	--	--
Thunder Seed	37004 R2Y	RR	00.4	2.3	6	29	29.7	17.8	56.0	--	--	32.1	--	--
Trial Mean				2.2	8	32	28.1	17.9	56.7	56.3	47.2	34.3	--	--
C.V.%				21.4	16.6	5.9	4.7	2.7	1.3	8.7	7.7	11.0	--	--
LSD 5%				0.3	2	3	2.1	0.8	1.2	6.8	5.9	6.1	--	--
LSD 10%				0.2	2	3	1.8	0.6	1.0	5.7	4.9	5.1	--	--

[a] *IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead*

Planting Date: May 17
Planting Rate: 150,000 PLS/A
Row Spacing: 15"
Tillage: Minimum Till
Previous Crop: 2014 & 2015 = wheat, 2016 = barley

Harvest Date: September 30
Soil Type: Williams Loam
Note: Oil, protein and yield are adjusted to 13% moisture.

NDSU North Central Research Extension Center

2017 RR Soybean Variety Trial at Mohall

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Assoc.

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Plant Height	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield 2017	Yield 2 yr	Yield 3 yr
				1-5[a]	inches	%	%	lbs/bu	bushels/acre				
Integra	20215	RR	00.9	2.2	29	32.0	16.4	57.2	76.7	52.2	36.8	44.5	55.2
Integra	20097	RR	00.9	2.1	31	31.7	17.5	56.5	--	46.7	39.8	43.2	--
Integra	20062	RR	00.6	2.2	32	32.6	16.8	56.6	--	--	42.3	--	--
Integra	50098	XT	00.9	2.1	33	31.9	15.9	56.4	--	--	41.2	--	--
Legend Seeds	LS 005X853	XT	00.5	2.1	32	30.0	16.9	57.6	--	--	36.3	--	--
Legend Seeds	LS 006R760N	RR	00.6	1.9	27	31.3	16.9	57.2	--	--	30.9	--	--
NDSU	ND17009GT	RR1	00.9	2.7	33	32.5	17.5	58.4	--	--	39.2	--	--
Legacy Seeds	LS-00835N RR2	RR	00.8	2.0	33	32.1	16.6	56.8	69.2	53.1	45.3	49.2	55.9
Legacy Seeds	LS-0135 RR2	RR	00.9	1.9	35	30.9	17.7	56.6	64.8	57.7	45.2	51.5	55.9
Legacy Seeds	LS-0214 RR2	RR	0.2	2.1	33	32.3	17.4	57.6	69.1	56.4	41.0	48.7	55.5
Legacy Seeds	LS-00834 RR2	RR	00.7	2.1	27	29.7	16.3	55.7	--	48.9	35.5	42.2	--
Legacy Seeds	LS-00737N RR2X	XT	00.7	2.0	28	30.8	16.2	56.6	--	--	42.0	--	--
Legacy Seeds	LS-0237 RR2X	XT	0.2	2.3	35	30.3	17.4	57.7	--	--	40.6	--	--
Legacy Seeds	LS-00937 RR2X	XT	00.9	1.9	32	30.3	16.3	57.3	--	--	39.5	--	--
Legacy Seeds	LS-00538N RR2X	XT	00.5	1.9	30	29.1	17.5	58.1	--	--	35.7	--	--
Legacy Seeds	LS-0337N RR2X	XT	0.3	2.1	30	31.2	17.5	57.5	--	--	35.4	--	--
NorthStar	NS 0081NR2	RR	00.8	2.0	31	31.6	16.8	56.2	60.7	51.1	37.5	44.3	49.8
NorthStar	NS 0072R2	RR	00.7	1.9	33	31.5	17.3	57.7	--	42.8	41.9	42.4	--
NorthStar	NS 0052R2	RR	00.5	2.1	34	30.9	17.3	56.3	--	42.9	40.9	41.9	--
NorthStar	NS 0012R2	RR	00.1	2.5	27	30.4	16.8	56.4	--	49.2	34.4	41.8	--
NorthStar	NS 60053XR2	XT	00.5	2.1	33	30.7	17.0	57.2	--	--	41.2	--	--
NorthStar	NS 60092XR2	XT	00.9	1.7	33	30.0	16.3	57.0	--	--	40.6	--	--
Proseed	10-08	RR	00.8	1.9	33	30.9	16.4	57.6	64.8	50.5	45.2	47.9	53.5
Proseed	XT 60-09	XT	00.9	2.1	32	31.4	16.0	57.2	--	52.2	41.7	47.0	--
Proseed	50-08	RR	00.8	2.4	30	31.1	16.9	57.3	--	--	42.7	--	--
Proseed	30-20	RR	0.2	1.9	34	31.3	17.5	57.0	--	--	41.1	--	--
Proseed	20-30	RR	0.3	2.1	32	31.8	16.9	58.3	--	--	37.1	--	--
Proseed	30-07	RR	00.7	1.9	26	31.2	16.1	54.8	--	--	29.2	--	--
Thunder Seed	SB88007N	XT	00.7	1.9	32	31.3	16.6	57.9	--	--	42.4	--	--
Thunder Seed	36008 R2YN	RR	00.8	2.3	33	30.7	17.1	57.0	--	--	42.1	--	--
Thunder Seed	Astro	RR	00.8	1.8	34	31.6	16.1	57.5	--	--	39.7	--	--
Thunder Seed	37004 R2Y	RR	00.4	2.3	32	31.7	16.9	57.3	--	--	36.7	--	--
Thunder Seed	3601 R2Y	RR	0.1	2.0	33	31.6	17.2	56.6	--	--	35.4	--	--
Thunder Seed	SB8703	XT	0.3	2.1	36	29.8	17.5	57.2	--	--	34.7	--	--

2017 RR Soybean Variety Trial at Mohall—Continued

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Assoc.

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Plant Height	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield 2017	Yield 2 yr	Yield 3 yr
				1-5[a]	inches	%	%	lbs/bu	bushels/acre				
Thunder Seed	34006 R2Y	RR	00.6	2.4	30	30.3	17.0	57.3	--	--	33.9	--	--
Thunder Seed	SB87009	XT	00.9	1.8	32	31.0	16.5	56.9	--	--	31.2	--	--
Prairie Brand	PB-0146R2	RR	0.1	2.1	31	31.1	17.5	56.1	74.0	61.9	39.7	50.8	58.5
Prairie Brand	PB-00856R2	RR	00.9	2.3	30	31.4	16.7	56.2	68.7	54.4	40.3	47.4	54.5
Prairie Brand	PB-00928R2	RR	00.9	2.7	33	30.7	17.5	57.2	--	--	44.7	--	--
Peterson Farms Seed	16R008N	RR	00.8	2.0	32	31.2	16.7	56.5	69.6	48.2	38.8	43.5	52.2
Peterson Farms Seed	17x009	XT	00.7	2.0	31	31.4	16.1	57.2	--	51.8	39.0	45.4	--
REA Hybrids	R00727	RR	00.7	1.9	28	29.2	17.5	56.0	--	54.1	37.6	45.9	--
REA Hybrids	RX0228	XT	0.2	1.5	33	31.0	17.2	57.3	--	--	41.2	--	--
REA Hybrids	RX00738	XT	00.7	2.2	31	31.0	15.9	57.7	--	--	39.0	--	--
Wensman	W3024R2	RR	0.2	2.3	31	31.4	16.4	56.7	80.1	53.5	40.4	47.0	58.0
Wensman	W30085NR2	RR	00.8	2.3	31	29.9	17.2	57.2	70.2	54.0	39.7	46.9	54.6
Wensman	W10063NRX	XT	00.6	2.1	30	30.9	16.2	57.1	--	53.6	41.1	47.3	--
Wensman	W30099R2	RR	00.9	1.9	33	30.3	17.0	57.8	--	--	44.0	--	--
Wensman	W1011RX	XT	0.1	2.3	30	29.7	17.8	57.5	--	--	38.7	--	--
Hefty Seed	H05x7	XT	0.5	2.4	30	31.8	16.6	57.7	--	53.7	43.3	48.5	--
Hefty Seed	H03x7	XT	0.3	2.1	29	31.3	17.4	57.4	--	54.1	38.0	46.1	--
Hefty Seed	H009x7	XT	00.9	1.9	32	30.4	16.3	57.3	--	--	42.3	--	--
Hefty Seed	H007x7	XT	00.7	2.1	29	31.4	16.0	56.9	--	--	40.9	--	--
Hefty Seed	H005x8	XT	00.5	2.1	30	28.2	17.6	58.1	--	--	36.6	--	--
Hefty Seed	H008x8	XT	00.8	2.3	31	30.0	17.1	57.8	--	--	32.1	--	--
Dyna-Gro	S009RY56	RR	00.9	2.1	33	31.4	17.0	57.3	--	53.5	39.2	46.3	--
Dyna-Gro	S006RY97	RR	00.6	2.0	29	31.3	17.0	56.9	--	51.3	39.9	45.6	--
Dyna-Gro	S005XT38	XT	00.5	1.8	30	29.8	17.3	57.0	--	--	39.8	--	--
Dyna-Gro	S009XT68	XT	00.9	2.1	31	29.2	16.8	57.0	--	--	37.8	--	--
Asgrow	AG00835	RR	00.8	--	28	29.7	16.3	56.7	--	--	36.8	--	--
Croplan Genetics	RX00926	XT	00.9	--	30	29.6	16.8	56.7	--	--	40.2	--	--
Croplan Genetics	R2T0091	RR	00.9	--	29	28.5	17.5	57.4	--	--	35.0	--	--
Trial Mean				2.2	31	30.8	16.9	57.1	65.1	52.1	38.9	--	--
C.V.%				21.4	8.5	5.0	3.3	1.1	7.0	6.6	8.5	--	--
LSD 5%				0.3	4	2.2	0.8	0.9	6.4	4.8	4.6	--	--
LSD 10%				0.2	3	1.8	0.7	0.7	5.4	4.0	3.8	--	--

[a] *IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead*

Planting Date: May 20
Harvest Date: October 3
Planting Rate: 150,000 PLS/A
Row Spacing: Solid Seeded (7" rows)
Soil Type: Barnes loam
Tillage: Minimum Till
Previous Crop: 2014 = oat, 2015 = sunflower, 2016 = durum
Note: Protein, oil, test weight and yield are adjusted to 13% moisture.

NDSU North Central Research Extension Center
2017 RR Soybean Variety Trial at Wilton
Cooperator: Rod Binstock, Baldwin

Company	Variety	Herbicide System	Maturity Group	IDC Rating	Plant Height	Protein	Oil	Test Weight	Yield 2016	Yield 2017	Yield Avg.
				1-5[a]	inches	%	%	lbs/bu	bu/A	bu/A	bu/A
Integra	20300	RR	0.3	--	28	32.8	15.6	56.3	53.3	47.5	50.4
Integra	20215	RR	00.9	2.2	27	31.8	15.6	55.8	48.7	46.6	47.7
Integra	20126	RR	0.1	2.1	28	32.4	16.1	55.5	--	53.7	--
Integra	50319N	XT	0.3	--	29	32.1	15.4	56.5	--	43.5	--
NDSU	ND17009GT	RR	00.9	2.7	27	34.0	16.4	57.5	--	41.5	--
Legacy Seeds	LS-0334 RR2	RR	0.3	2.2	31	34.0	15.4	56.5	58.8	53.3	56.1
Legacy Seeds	LS-0337N RR2X	XT	0.3	2.1	26	32.3	16.1	56.2	49.9	48.9	49.4
Legacy Seeds	LS-0135 RR2	RR	00.9	1.9	30	32.4	16.4	55.6	49.0	48.2	48.6
Legacy Seeds	LS-00835N RR2	RR	00.8	2.3	29	33.0	15.7	55.0	47.1	46.7	46.9
Legacy Seeds	LS-0214 RR2	RR	0.2	2.1	28	32.6	16.1	55.3	--	56.8	--
Legacy Seeds	LS-0237 RR2X	XT	0.2	2.3	33	31.8	15.7	55.9	--	54.4	--
Legacy Seeds	LS-00937 RR2X	XT	00.9	1.9	30	32.9	14.9	56.2	--	54.1	--
Legacy Seeds	LS-0438 RR2X	XT	0.4	2.1	28	32.5	16.2	55.7	--	48.0	--
Legacy Seeds	LS-00538N RR2X	XT	00.5	2.0	30	30.5	16.2	55.8	--	46.8	--
Legacy Seeds	LS-00737N RR2X	XT	00.7	2.0	26	32.1	15.5	55.9	--	46.1	--
Legacy Seeds	LS-00834 RR2	RR	00.8	2.1	23	32.1	15.0	54.4	--	43.9	--
Proseed	20-30	RR	0.3	2.1	27	32.8	15.7	56.0	58.3	50.5	54.4
Proseed	30-20	RR	0.2	1.9	27	32.7	16.1	55.6	--	58.0	--
Proseed	11-50	RR	0.5	--	30	32.1	15.7	56.5	--	55.3	--
Proseed	XT 605	XT	0.5	--	29	33.3	15.7	55.2	--	43.8	--
Thunder Seed	SB8703	XT	0.3	2.1	33	31.8	15.9	56.0	--	55.2	--
Thunder Seed	3601 R2Y	RR	0.1	2.0	30	32.7	16.6	55.6	--	49.1	--
Thunder Seed	SB87009	XT	00.9	1.8	28	32.8	14.8	56.1	--	47.3	--
Thunder Seed	SB88007N	XT	00.7	1.9	29	31.7	16.3	55.7	--	45.4	--
Thunder Seed	37004 R2Y	RR	00.4	2.3	26	32.8	16.2	55.6	--	44.4	--
Thunder Seed	34006 R2Y	RR	00.6	2.4	26	32.2	16.0	55.0	--	42.4	--
Thunder Seed	Astro	RR	00.8	1.8	25	33.0	15.1	55.8	--	41.5	--
Thunder Seed	36008 R2YN	RR	00.8	2.3	27	33.0	15.7	55.7	--	39.9	--
REA Hybrids	RX0327	XT	0.3	2.2	27	32.4	16.3	56.0	--	49.0	--
REA Hybrids	RX0516	XT	0.5	2.6	27	32.7	14.8	56.5	--	48.8	--
Wensman	W3024R2	RR	0.2	2.3	29	31.8	15.7	56.1	40.6	50.8	45.7
Wensman	W1011RX	XT	0.1	2.3	29	32.7	16.2	55.8	--	53.7	--
Wensman	W1048NRX	XT	0.4	2.0	28	32.3	16.2	56.4	--	51.3	--
Wensman	W1039NRX	XT	0.3	2.3	30	32.0	15.5	55.6	--	42.8	--
Hefty Seed	H05x7	XT	0.5	2.4	30	33.1	15.3	56.1	54.8	49.6	52.2
Hefty Seed	H03x7	XT	0.3	2.1	27	32.9	15.9	56.2	47.8	49.5	48.7
Hefty Seed	H009x7	XT	00.9	1.9	30	32.7	14.9	56.5	46.9	50.3	48.6
Hefty Seed	H00R6	RR	0.0	--	30	32.4	16.7	55.7	--	48.6	--
Hefty Seed	H008x8	XT	00.8	2.3	28	31.7	16.3	55.3	--	43.4	--
Hefty Seed	H005x8	XT	00.5	2.1	27	30.7	16.2	55.5	--	43.1	--
Hefty Seed	H007x7	XT	00.7	2.1	24	32.2	15.7	56.5	--	42.8	--
Dyna-Gro	S03RY36	RR	0.3	1.8	26	33.5	15.6	56.4	--	55.9	--
Dyna-Gro	S05XT88	XT	0.5	2.3	28	32.7	16.3	55.8	--	45.5	--
Trial Mean				2.2	28	32.5	15.8	55.9	49.4	47.7	--
C.V.%				21.4	7.7	1.5	1.8	1.1	8.2	8.6	--
LSD 5%				0.3	3	0.7	0.4	0.9	5.7	5.8	--
LSD 10%				0.2	3	0.6	0.3	0.7	4.7	4.8	--

[a] *IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead*

Planting Date: May 19 *Harvest Date: October 2*

Row Spacing: Solid Seeded (7" rows) *Soil Type: Williams loam*

Previous Crop: 2014 = spring wheat, 2015 = soy, 2016 = spring wheat

Note: Protein, oil, test weight and yield are adjusted to 13% moisture.

NDSU North Central Research Extension Center
2017 RR Soybean Yield Results from the North Central Region

Company	Variety	Maturity Group	IDC Rating	Seed Yield			3 Location
				Mohall	Minot	Wilton	Average
			[a]1-5	bushels/acre			
Legacy Seed	LS-0214 RR2	0.2	2.1	41.0	38.7	56.8	45.5
Wensman Seed	W1011RX	0.1	2.3	38.7	41.8	53.7	44.7
Proseed	30-20	0.2	1.9	41.1	34.6	58.0	44.6
Wensman Seed	W3024R2	0.2	2.3	40.4	39.0	50.8	43.4
Thunder Seed	SB8703	0.3	2.1	34.7	38.5	55.2	42.8
Hefty Seed	H009x7	00.9	1.9	42.3	34.6	50.3	42.4
Legacy Seed	LS-0237 RR2X	0.2	2.3	40.6	31.7	54.4	42.2
Legacy Seed	LS-00737N RR2X	00.7	2.0	42.0	38.5	46.1	42.2
Legacy Seed	LS-0135 RR2	00.9	1.9	45.2	32.4	48.2	41.9
Legacy Seed	LS-00937 RR2X	00.9	1.9	39.5	31.0	54.1	41.5
Thunder Seed	3601 R2Y	0.1	2.0	35.4	39.8	49.1	41.4
Thunder Seed	SB88007N	00.7	2.2	42.4	36.3	45.4	41.4
Hefty Seed	H05x7	0.5	2.4	43.3	30.6	49.6	41.2
Thunder Seed	Astro	00.8	1.8	39.7	40.5	41.5	40.6
Legacy Seed	LS-00835N RR2	00.8	2.3	45.3	29.8	46.7	40.6
Proseed	20-30	0.3	2.1	37.1	33.5	50.5	40.4
Hefty Seed	H03x7	0.3	2.1	38.0	33.4	49.5	40.3
Thunder Seed	36008 R2YN	00.8	2.3	42.1	38.8	39.9	40.3
Hefty Seed	H007x7	00.7	2.1	40.9	34.7	42.8	39.5
Legacy Seed	LS-0337N RR2X	0.3	2.1	35.4	33.1	48.9	39.2
Legacy Seed	LS-00538N RR2X	00.5	2.0	35.7	33.6	46.8	38.7
Hefty Seed	H008x8	00.8	2.3	32.1	39.1	43.4	38.2
Hefty Seed	H005x8	00.5	2.1	36.6	34.2	43.1	38.0
Thunder Seed	37004 R2Y	00.4	2.3	36.7	32.1	44.4	37.7
Integra	20215	00.9	2.2	36.8	29.4	46.6	37.6
Thunder Seed	SB87009	00.9	1.8	31.2	34.1	47.3	37.6
Thunder Seed	34006 R2Y	00.6	2.4	33.9	34.7	42.4	37.0
NDSU	ND17009GT	00.9	2.7	39.2	27.4	41.5	36.0
Legacy Seed	LS-00834 RR2	00.7	2.1	35.5	27.8	43.9	35.8
Asgrow	AG00835	00.8	--	36.8	--	--	--
Croplan Genetics	RX00926	00.9	--	40.2	--	--	--
Croplan Genetics	R2T0091	00.9	--	35.0	--	--	--
Dairyland Seed	DSR-C918/R2Y	00.9	2.2	--	33.4	--	--
Dairyland Seed	DSR-0225/R2Y	0.2	2.1	--	36.2	--	--
Dairyland Seed	DST00-003/R2Y	0.0	2.6	--	47.0	--	--
Dyna-Gro	S05XT88	0.5	2.3	--	--	45.5	--
Dyna-Gro	S006RY97	00.6	2.0	39.9	--	--	--
Dyna-Gro	S005XT38	00.5	1.8	39.8	--	--	--
Dyna-Gro Seed	S009RY56	00.9	2.1	39.2	32.6	--	--
Dyna-Gro Seed	S03RY36	0.3	1.8	--	45.0	55.9	--
Dyna-Gro Seed	S009XT68	00.9	2.1	37.8	34.0	--	--
Hefty Seed	H00R6	0.0	--	--	--	48.6	--
Integra	20097	00.9	2.1	39.8	29.8	--	--
Integra	20126	0.1	2.1	--	31.4	53.7	--
Integra	20062	00.6	2.2	42.3	29.6	--	--
Integra	20300	0.3	--	--	--	47.5	--
Integra	50319N	0.3	--	--	--	43.5	--
Integra	50098	00.9	2.1	41.2	--	--	--
Legacy Seeds	LS-0334 RR2	0.3	2.2	--	--	53.3	--

2017 RR Soybean Yield Results from the North Central Region—Continued

Company	Variety	Maturity Group	IDC Rating	Seed Yield Mohall	Seed Yield Minot	Seed Yield Wilton	3 Location Average
			1-5a	bushels/acre			
Legacy Seeds	LS-0438 RR2X	0.4	2.1	--	--	48.0	--
Legend Seeds	LS 009X852N	00.9	1.9	--	34.3	--	--
Legend Seeds	LS 01X850	0.1	1.8	--	26.3	--	--
Legend Seeds	LS 005X853	00.5	2.1	36.3	25.6	--	--
Legend Seeds	LS 006R760N	00.6	1.9	30.9	22.2	--	--
NorthStar	NS 0052R2	00.5	2.1	40.9	--	--	--
NorthStar	NS 0012R2	00.1	2.5	34.4	--	--	--
NorthStar	NS 60053XR2	00.5	2.1	41.2	--	--	--
NorthStar Genetics	NS 0081NR2	00.8	2.0	37.5	34.0	--	--
NorthStar Genetics	NS 0072R2	00.7	2.0	41.9	32.7	--	--
NorthStar Genetics	NS 0111R2	0.1	1.9	--	31.2	--	--
NorthStar Genetics	NS 60082NXR2	00.8	1.9	--	30.7	--	--
NorthStar Genetics	NS 60092XR2	00.9	1.7	40.6	29.4	--	--
NorthStar Genetics	NS 60442NXR2	0.4	2.2	--	26.7	--	--
Peterson Farms Seed	16R01	0.1	2.1	--	41.9	--	--
Peterson Farms Seed	16R008N	00.8	2.0	38.8	32.8	--	--
Peterson Farms Seed	17x009	00.7	2.0	39.0	37.5	--	--
Peterson Farms Seed	18X008N	00.8	2.0	--	38.8	--	--
Prairie Brand Seed	PB-0146R2	0.1	2.1	39.7	38.6	--	--
Prairie Brand Seed	PB-00928R2	00.9	2.7	44.7	40.7	--	--
Prairie Brand Seed	PB-0397R2	0.3	2.1	--	37.2	--	--
Prairie Brand Seed	PB-00856R2	00.9	2.3	40.3	33.9	--	--
Proseed	10-08	00.8	1.9	45.2	38.1	--	--
Proseed	XT 60-09	00.9	2.1	41.7	34.1	--	--
Proseed	50-08	00.8	2.4	42.7	35.0	--	--
Proseed	30-07	00.7	1.9	29.2	25.8	--	--
Proseed	11-50	0.5	--	--	--	55.3	--
Proseed	XT 605	0.5	--	--	--	43.8	--
REA Hybrids	R00727	00.7	1.9	37.6	41.8	--	--
REA Hybrids	RX00738	00.7	2.2	39.0	39.0	--	--
REA Hybrids	RX0228	0.2	1.5	41.2	34.9	--	--
REA Hybrids	RX0327	0.3	2.2	--	31.7	49.0	--
REA Hybrids	RX0516	0.5	2.6	--	--	48.8	--
Wensman	W1048NRX	0.4	2.0	--	--	51.3	--
Wensman	W1039NRX	0.3	2.3	--	--	42.8	--
Wensman	W30099R2	00.9	1.9	44.0	--	--	--
Wensman Seed	W30085NR2	00.8	2.3	39.7	33.7	--	--
Wensman Seed	W10063NRX	00.6	2.1	41.1	38.8	--	--
Trial Mean				38.9	34.3	47.7	--
C.V.%				8.5	11.0	8.6	--
LSD 5%				4.6	6.1	5.8	--
LSD 10%				3.8	5.1	4.8	--

a IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead

NDSU North Central Research Extension Center
2017 Non-Roundup Ready Soybean Variety Trial at Minot

Company/ Brand	Variety	Maturity Group	Herbicide System	IDC Rating	Maturity Date	Plant Height	Lodging	Protein	Oil	Test Weight	----- Seed Yield ----- 2015	2016	2017	--- Average --- 2 year	3 year
				1-5[a]	Sept.	inches	0-9[b]	%	%	lbs/bu	---------- bushels per acre ----------				
Integra	INT 30208N	0.2	LL	2.0	9	31	0	27.6	17.8	54.0	--	--	33.1	--	--
Integra	INT 30080	00.8	LL	--	6	31	0	29.1	17.6	54.6	--	--	31.9	--	--
NDSU	ND Henson	0.0	Convent	2.3	8	28	0	25.7	19.2	56.5	53.4	48.9	22.0	35.4	41.42
NDSU	ND Bison	0.7	Convent	1.8	12	30	0	26.6	18.0	55.5	55.1	41.0	35.0	38.0	43.69
NDSU	ND Benson	0.4	Convent	1.7	14	36	0	27.9	18.7	54.9	47.7	44.0	31.4	37.7	41.03
NDSU	ND Stutsman	0.7	Convent	1.9	12	36	0	26.6	18.1	56.0	55.2	43.3	37.2	40.2	45.22
RR check	AG 00932	00.9	RR	--	6	33	0	28.4	16.6	54.4	46.3	42.4	28.2	35.3	38.98
RR check	AG 00632	00.6	RR	--	5	31	0	28.8	16.9	55.1	45.6	35.8	27.4	31.6	36.27
Trial Mean				2.0	8	31	0	27.3	18.1	55.0	52.6	42.3	28.5	--	--
C.V.%				20.6	17.0	6.9	0.0	6.1	2.6	1.2	5.4	10.9	19.0	--	--
LSD 5%				0.3	2	3	NS	2.7	0.8	1.1	4.0	7.6	9.0	--	--
LSD 10%				0.2	2	3	NS	2.3	0.6	0.9	3.3	6.3	7.5	--	--

[a]IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead [b]Lodging: 0 = none, 9 = lying flat on the ground.
NS = no statistical difference between varieties.

Planting Date: May 17 *Planting Rate: 150,000 PLS/A* *Row Spacing: 15"*
Harvest Date: September 30 *Previous Crop: 2014 & 2015 = spring wheat, 2016 = barley*
Soil Type: Williams Loam *Tillage System: Minimum till*
Note: Oil, protein, test weight and yield are adjusted to 13% moisture.

NDSU North Central Research Extension Center
2016 Soybean Seeding Rate and Row Spacing Trial at Garrison

Seeding Rate Comparisons

Seeding Rate	Plant Height	Protein	Oil	Test Weight	Yield
1000's/A	inches	%	%	lbs/bu	bu/A
75	24	31.1	16.2	57.9	21.3
100	24	31.2	16.4	57.7	24.8
125	24	31.1	16.4	57.8	23.9
150	23	31.2	16.5	57.8	25.2
LSD 0.05	NS	NS	NS	NS	2.7

Row Spacing Comparisons

Row Spacing	Plant Height	Protein	Oil	Test Weight	Yield
inches	inches	%	%	lbs/bu	bu/A
7	24	31.0	16.5	57.7	25.4
14	23	31.4	16.2	58.0	23.8
21	24	31.1	16.6	57.7	22.2
LSD 0.05	NS	NS	NS	NS	2.3

Seeding Rate by Row Spacing Interactions

Row Spacing	Seeding Rate	Plant Height	Protein	Oil	Test Weight	Yield
inches	1000's/A	inches	%	%	lbs/bu	bu/A
7	75	24	31.0	16.3	57.6	21.7
	100	25	30.9	16.8	57.5	25.0
	125	23	30.9	16.4	57.8	25.9
	150	25	31.1	16.5	57.9	29.0
14	75	22	31.6	15.8	57.9	19.4
	100	23	31.4	16.0	58.0	24.1
	125	25	31.3	16.5	58.0	25.8
	150	23	31.3	16.4	57.9	26.1
21	75	26	30.8	16.6	58.1	22.8
	100	23	31.2	16.5	57.6	25.4
	125	25	31.1	16.5	57.6	20.2
	150	22	31.3	16.6	57.6	20.6
LSD 0.05		2	NS	NS	NS	4.4

NS = no statistical difference between treatments.

Planting Date: June 2 *Harvest Date: October 13* *Variety: Asgrow 0231*
Tillage: No-till *Previous Crop: canola* *Soil Type: Williams Bowbells loam*

Summary: Seeding rates did not have an impact on plant height, protein, oil or test weight. 100k and 150k seeding rates produced statistically higher yields than the 75k rate and 100k, 125k and 150k rates produced similar yields. Statistically significant differences between row spacing was observed for yield with 7 inch rows producing higher yields than 21 inch rows. Seeding rate by row spacing interactions were detected with yields having an inverse relationship between row spacing and seeding rates. In other words, as you widen your row spacing, you should lower your seeding rate to achieve optimum yield.

NDSU North Central Research Extension Center
2017 Dry Pea Variety Trial at Minot

Variety	Days to Flower	Days to Maturity	Vine Length	Lodging	Seeds/ Pound	1000 Seed Weight	Test Weight	Protein	Seed Yield 2015	2016	2017	2 Year	3 Year
	DAP[1]	DAP[1]	cm	(0-9)[2]		grams	lb/bu	%	bu/A				
Yellow Cotyledon													
MP 1907	58	92	72	2	1884	241	64.6	24.9	--	--	59.9	--	--
Salamanca	55	88	76	2	1906	239	64.5	24.0	44.5	56.6	59.7	58.2	53.6
CDC Amarillo	58	92	69	1	1941	234	64.3	24.2	54.7	49.2	59.0	54.1	54.3
PP-0555	57	88	73	1	2142	212	65.1	23.5	--	--	56.0	--	--
Navarro	50	89	65	2	1815	251	64.5	23.0	--	--	56.0	--	--
AC Earlystar	56	86	76	2	2173	209	64.2	22.7	53.0	55.4	55.9	55.7	54.8
PP-9132	57	92	69	1	1888	241	64.8	23.9	--	--	55.4	--	--
PP-0667	55	90	64	2	2192	208	65.4	23.6	53.6	49.3	54.5	51.9	52.4
Bridger	52	87	61	2	2158	211	64.2	23.4	--	46.9	53.6	50.3	--
Gunner	56	91	80	2	1950	233	64.5	23.4	--	--	53.4	--	--
CDC Inca	57	91	68	1	2073	219	63.8	24.0	--	--	53.4	--	--
Oro	56	89	72	1	1988	229	65.7	24.7	--	--	52.9	--	--
AAC Carver	55	87	66	1	2015	226	64.9	22.4	58.2	44.0	52.8	48.4	51.7
Majestic	57	90	74	1	1911	238	64.6	23.8	--	50.7	52.2	51.4	--
Jetset	56	89	68	2	1880	242	64.9	24.3	52.3	46.9	52.1	49.5	50.4
Agassiz	56	91	68	2	1947	233	64.6	23.0	51.9	55.7	51.8	53.7	53.1
Hyline	56	91	66	2	1892	240	63.8	22.6	58.0	47.0	46.1	46.6	50.4
CDC Saffron	57	92	63	2	1923	236	64.9	24.0	59.4	54.9	45.3	50.1	53.2
PP-0004	58	91	64	1	1980	229	64.3	23.9	--	--	44.4	--	--
DS Admiral	55	88	66	2	1931	235	64.1	24.0	48.0	55.0	44.0	49.5	49.0
Spider	58	94	66	1	1908	238	65.4	24.4	60.5	41.4	35.3	38.4	45.7
Green Cotyledon													
CDC Greenwater	58	92	68	1	1924	237	64.4	23.7	--	--	63.6	--	--
AAC Comfort	62	91	64	2	1776	256	64.3	23.3	--	--	62.9	--	--
Arcadia	52	89	63	2	2328	195	63.7	23.2	--	47.1	56.3	51.7	--
Bluemoon	54	87	63	2	1922	237	63.8	24.7	58.7	52.1	54.2	53.2	55.0
Majoret	57	90	62	2	2027	224	64.9	25.2	--	--	49.2	--	--
Cruiser	52	89	66	2	2167	210	63.5	23.6	52.4	43.0	47.5	45.3	47.6
Shamrock	60	93	62	2	2094	217	64.3	22.5	--	--	44.5	--	--
CDC Striker	54	90	61	2	2307	197	63.8	23.7	52.2	49.5	40.6	45.0	47.4
Marrowfat													
Orka	54	92	65	3	1309	347	63.5	23.7	--	--	45.5	--	--
Trial Mean	56	90	67	2	1978	232	64.4	23.7	53.1	49.2	51.9	--	--
CV	2.4	3.0	11.8	38.9	3.3	3.3	1.2	2.8	10.5	26.5	20.2	--	--
LSD 5%	2	3	13	1	78	9	0.9	0.8	6.6	14.9	12.3	--	--
LSD 10%	1	2	7	1	60	7	0.7	0.6	5.1	11.6	9.6	--	--

[1] *Days after planting*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

Planting Date: April 20 Harvest Date: July 31

NDSU North Central Research Extension Center
2017 Field Pea Seed Singulation Trial at Minot

Variety	Seeding Rate	Harvest Stand	Days to Bloom	Days to Mature	Plant Height	Lodging	1000 KWT	Test Weight	Seed Yield
	seeds/A	plants/A	DAP[1]	DAP[1]	inches	0-9*	g	lbs/bu	lbs/A
Striker	150k	144,555	49	75	22	3	211	68.6	1508
Striker	200k	125,195	49	74	21	2	206	67.8	1577
Striker	250k	118,741	49	74	22	2	208	67.7	1853
Striker	300k	122,613	49	74	20	2	210	67.7	1428
Striker	350k	151,008	49	74	21	1	201	67.5	1885
Treasure	150k	120,032	47	71	23	2	194	66.9	1746
Treasure	200k	149,717	47	71	24	3	195	68.1	2270
Treasure	250k	127,776	47	71	25	3	196	67.9	2351
Treasure	300k	116,160	48	72	26	2	195	68.5	2038
Treasure	350k	139,392	46	71	24	2	198	67.8	2516
C.V.%		17.8	0.8	1.1	7.2	29.0	3.8	1.5	17.0
LSD 0.05		NS	1.0	1	3	NS	13	NS	560

Combined Means

Seeding Rate	Harvest Stand	Days to Bloom	Days to Mature	Plant Height	Lodging	1000 KWT	Test Weight	Seed Yield
seeds/A	plants/A	DAP[1]	DAP[1]	inches	0-9*	g	lbs/bu	lbs/A
150k	132,293	48	73	22	2	202	67.7	1627
200k	137,456	48	72	22	3	200	67.9	1924
250k	123,259	48	72	23	3	202	67.8	2102
300k	119,387	49	73	23	2	202	68.1	1733
350k	145,200	48	72	23	2	200	67.7	2200
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

[1] *DAP = Days after planting.* **Lodging: 0 = none, 9 = lying flat on the ground.*

NS = no statistical difference between seeding rates.

Planting Date: May 17 *Harvest Date: August 1*

Row Spacing: 15" *Previous Crop: Canola*

Tillage System: Transitional No-till (2nd year) *Soil Type: Williams Loam*

Note: The trial was grown under severe drought (3.6" of precip from January 1 - June 30).

Summary: The trial was planted with Great Plains no-till openers using Monosem seed singulation meters. The month of May was very dry and probably hindered germination and seedling establishment. The trial also sustained severe drought throughout the growing season which limited growth and yield. The harvested plant stand was inconsistent with seeding rates and had no correlation with seed yield. All seeding rates produced statistically similar agronomic and seed quality characteristics within each variety and as a combined group. Additional trials will need to be conducted in order to make firm conclusions on this technology.

NDSU North Central Research Extension Center
2017 Lentil Variety Trial at Minot

Variety	Days to Flower	Days to Maturity	Lodging	1000 Seed Weight	Seeds/ Pound	Test Weight	Seed Yield
	DAP[1]	DAP[1]	(0-9)[2]	g	#	lb/bu	lb/A
Small Brown							
Pardina	49	83	3.5	38.6	11771	61.8	1047
Large Green							
Pennell	52	90	1.5	58.4	7789	57.9	1719
CDC Greenland	55	92	2.8	56.9	7984	56.9	1581
Riveland	50	88	2.5	64.0	7110	55.4	1229
Medium Green							
Avondale	53	86	2.4	45.8	10093	56.7	1770
CDC Richlea	54	90	2.1	49.7	9358	60.0	1598
Small Green							
CDC Viceroy	54	89	2.4	32.1	14204	62.8	2006
Eston	53	85	1.9	31.0	14915	47.0	1584
ND Eagle	52	84	2	35.7	12758	62.2	1873
CDC Lemay	55	89	3	29.6	15888	45.1	968
Small Red							
CDC Red Rider	52	90	1.8	40.6	11265	62.2	1633
CDC Redberry	56	91	1.0	40.1	11337	61.6	1630
CDC Rosetown	56	88	2	27.0	17089	44.8	1535
CDC Rouleau	56	89	1.6	37.3	12338	59.5	1465
Trial Mean	53	88	2	43	11377	57.2	1575
CV	4.0	4.0	27.5	8.5	12.3	22.0	29.2
LSD 5%	3	4	1	4	1665	15.0	547
LSD 10%	2	3	1	3	1289	11.6	423

[1] *Days after planting*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

Planted: 4/20/2017; Harvested: 8/11/2017

Previous crop: Spring Wheat

NDSU North Central Research Extension Center
2017 Clearfield Lentil Variety Trial at Minot

Variety	Market Class	First Flower	Days to Maturity	Harvest Height	Lodging	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield 2016	Seed Yield 2017	Seed Yield 2 Year Avg
		DAP[1]	DAP[1]	cm	(0-9)[2]		grams	lbs/bu		lb/A	
Avondale	Large Green	56	97	31	2.3	9608	47.4	61.1	--	2904	--
CDC Proclaim-CL	Small Red	56	95	39	1.0	11459	39.7	61.7	--	2476	--
CDC Imvincible-CL	Small Green	59	94	26	2.8	14478	31.4	62.5	2068	2469	2268
CDC Impress-CL	Med Green	58	97	29	3.0	8916	50.9	61.1	1653	2406	2030
CDC Impala-CL	Extra Small Red	61	95	35	2.3	15893	28.6	63.3	1444	2138	1791
CDC Maxim-CL	Small Red	57	95	33	1.3	11717	38.8	62.5	2335	1994	2165
CDC Dazil-CL	Small Red	57	97	31	2.0	6757	67.3	60.4	--	1777	--
CDC Peridot-CL	Small Green	57	93	28	2.3	13415	33.9	62.8	--	1757	--
Trial Mean		58	96	32	2.0	11122	44.2	61.8	1830	2223	--
CV		1.8	2.1	10.8	18.7	4.3	3.8	0.6	15	16.6	--
LSD 5%		1	2	4	0.4	574.9	2.0	0.5	399	444	--
LSD 10%		1	2	3	0.3	443.4	1.5	0.4	330	343	--

[1] *Days after planting*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

Planted: April 20, 2017; Harvested: Aug. 10, 2017
Previous crop: hard red spring wheat

NDSU North Central Research Extension Center
2017 Chickpea Variety Trial at Minot

Variety	Market Class	Leaf Type	Days to Flower	Days to Maturity	> 10	> 9	> 8	< 8	Test Weight	Seed Yield
					----------mm----------					
			DAP[1]	DAP[1]	%	%	%	%	lb/bu	lb/A
Sawyer	Kabuli	Simple	50	95	3.8	17.9	38.9	39.5	57.8	1192.1
CDC Orion	Kabuli	Compound	50	96	3.4	21.2	43.5	30.2	59.0	1186.7
CDC Luna	Kabuli	Compound	52	95	0.3	2.5	36.0	61.2	57.8	1184.9
CDC Anna	Desi	Compound	52	94	0.0	0.0	0.3	99.7	57.8	1145.6
CDC Frontier	Kabuli	Compound	58	95	0.0	2.2	17.3	82.6	54.3	1136.3
B-90	Kabuli	Compound	55	96	0.0	0.1	0.6	99.4	55.0	1117.5
Sierra	Kabuli	Simple	54	95	8.7	21.6	41.9	27.8	52.3	1052.7
Trial Mean			53	95	4.6	18.7	51.0	125.8	56.3	1145
CV			3.8	0.7	29.7	18.7	7.3	3.2	11.8	7.3
LSD 5%			2	1	3.4	8.6	9.1	9.9	8.3	104

[1] *Days after planting*

Planted: April 27, 2017; Harvested: Aug.3, 2017

Previous crop: hard red spring wheat

NDSU North Central Research Extension Center
2017 Chickpea Seed Singulation and Row Spacing Trial at Minot

Variety	Row Spacing	Seeding Rate	Harvest Stand	Foliar Disease*	1000 KWT	Seed Size				Seed Yield
						<10mm	10-9mm	9-8mm	>8mm	
		Seeds/A	plants/A	%	g	%	%	%	%	lbs/A
Frontier	10"	130K	38,720	3	331	4	46	36	13	1249
		175k	40,656	7	338	14	49	24	13	1789
		220k	44,528	3	335	10	45	32	13	1594
	15"	130K	36,139	15	351	10	47	30	13	1062
		175k	34,848	7	356	12	47	30	11	1160
		220k	51,627	2	365	9	54	31	7	972
B-90	10"	130K	38,720	7	294	0	4	43	53	751
		175k	40,656	7	273	0	3	32	65	1260
		220k	44,528	2	271	0	2	29	68	1217
	15"	130K	40,011	7	275	0	3	33	64	849
		175k	37,429	5	279	1	3	31	65	918
		220k	42,592	5	281	1	4	35	60	1171
C.V.%			28	88	2.8	69	10.4	14.0	12.8	20.4
LSD 5%			NS	NS	15	6	5	8	8	402

Combined Means-Variety

Variety	Harvest Stand	Foliar Disease*	1000 KWT	Seed Size				Seed Yield
				<10mm	10-9mm	9-8mm	>8mm	
	plants/A	%	g	%	%	%	%	lbs/A
Frontier	41,086	6	346	10	48	31.0	12.0	1304
B-90	40,656	5	279	0	3	34.0	63.0	1028
LSD 5%	NS	NS	9	2	2	NS	4	224

Combined Means-Row Spacing

Row Spacing	Harvest Stand	Foliar Disease*	1000 KWT	Seed Size				Seed Yield
				<10mm	10-9mm	9-8mm	>8mm	
	plants/A	%	g	%	%	%	%	lbs/A
10"	41,301	5	307	5	25	33	38	1310
15"	40,441	7	318	5	26	32	37	1022
LSD 5%	NS	NS	NS	NS	NS	NS	NS	222

2017 Chickpea Seed Singulation and Row Spacing Trial at Minot—Continued

Combined Means-Seeding Rate

Seeding Rate	Harvest Stand	Foliar Disease*	1000 KWT	Seed Size				Seed Yield
				<10mm	10-9mm	9-8mm	>8mm	
Seeds/A	plants/A	%	g	%	%	%	%	lbs/A
130k	38,397	8	313	3	25	35	36	978
175k	38,397	6	311	6	26	29	39	1282
220k	45,819	3	313	5	26	32	37	1239
LSD 5%	NS	4	NS	NS	NS	4	NS	280

**Foliar Disease: Visual estimation of foliage infected with ascochyta.*

NS = No statistical difference between treatments.

Planting Date: May 18 *Harvest Date: September 29*

Soil Type: Williams Loam *Tillage System: Transitional No-till (2nd year)*

Note: The trial sustained severe drought (3.6" of precip Jan 1 - July 30)

Summary: The objective of this trial was to utilize seed singulation technologies to optimize plant spacing and potentially reduce the planting rate and seed cost of this crop while maintaining or improving seed quality and yield. The trial was planted with Great Plains no-till openers using Monosem seed singulation meters. The month of May was extremely dry, hindering germination and seedling growth. The trial also sustained severe drought throughout the growing season which limited growth, disease infection and yield. As would be expected, statistical differences between varieties was observed, with Frontier producing larger seeds and a higher yield than the B-90's. The only statistical difference between row spacing was for yield with the 10 inch spacing producing a higher yield than the 15 inch row spacing. Seeding rates produced similar plant stands and also showed the level of seed / seedling mortality caused by this year's unfavorable growing conditions. These similar plant stands produced somewhat similar seed yields although the 170k rate produced a statistically higher yield than the 130k rate. The 130k, 175k and 220k seeding rates correspond to 3, 4 and 5 seeds per square foot respectively, with 4 seeds per square foot being the current recommended seeding rate. This trial will need to be repeated in order to validate conclusions and to provide any additional meaningful recommendations based on seed singulation technologies for this crop.

Pinto Bean Variety Descriptions.

Class and Cultivar	Origin	RM[1]	Plant Type[2]
PINTO			
Blackfoot	Univ. of Idaho	M	USV
Cowboy	Provita	--	--
El Diablo Fu	GenTec	ME	USV
La Paz	Provita	L	USV
Lariat	NDSU	L	USV
Maverick	NDSU	ME	V
Monterrey	Provita	ME	USV
ND-Palomino	NDSU	ML	USV
ND-307	NDSU	M	UV
Nez Perce	Univ. of Idaho	M	UV
Othello	USDA-Prosser	E	V
Radiant	Provita	ML	USV
Santa Cruz	Provita	M	USV
Sinaloa	Provita	ML	USV
StayBright	Colorado State Univ.	ML/L	UV
Stampede	NDSU	M	USV
SV6139GR	Seminis	--	--
Torreon	Provita	M	USV
Twin Falls	Univ. of Idaho	M	USV
Vibrant	Provita	E	USV
Windbreaker	Seminis	M	UV

[1]RM = Relative Maturity; E = Early; ME = Medium Early; M = Medium; ML = Medium Late; L = Late.

[2]V = Vine; UV = Upright Vine; USV = Upright Short Vine; B = Bush.

Navy Bean Variety Descriptions.

Class and Cultivar	Origin	RM[1]	Plant Type[2]
NAVY			
Avalanche	NDSU	ME	USV
Blizzard	Provita	M	USV
DS105W0	Dow AgroSciences	ML	USV
Ensign	ADM-Seedwest	M	USV
HMS Medalist	AmeriSeed	M	UV
Mist	Ag. Can.	M	USV
Nautica	Ag. Can.	ML	USV
T9905	Hyland	M	USV
Vigilant	Provita	ME	USV
Vista	Ag. Can.	ML	USV

[1]RM = Relative Maturity; E = Early; ME = Medium Early M = Medium; ML = Medium Late; L = Late.

[2]V = Vine; UV = Upright Vine; USV = Upright Short Vin B = Bush.

Small Red, Black, and Pink Bean Variety Descriptions.

Class and Cultivar	Origin	RM[1]	Plant Type[2]
SMALL RED			
Merlot	MSU	ME	USV
Ruby	Provita	M	USV
Viper	Provita	M	USV
BLACK			
Black Cat	Provita	ME	USV
CDC Blackstrap	U. Sask.	E	USV
Eclipse	NDSU	M	USV
GTS-1103	GenTec	M	USV
Jet	U. Sask.	E	USV
Knight Rider	Meridian Seeds	ML	USV
Loreto	Provita	M	USV
Super Jet	U. Sask.	ME	USV
T-39	U. Calif.	M	USV
Zenith	MSU	M	USV
Zorro	MSU	L	USV
PINK			
Floyd	Rogers	ML	V
Rosetta	MSU/ARS	M	USV
Sedona	MSU/ARS	M	USV

[1]RM = Relative Maturity; E = Early; ME = Medium Early; M = Medium; ML = Medium Late; L = Late.

[2]V = Vine; UV = Upright Vine; USV = Upright Short Vine; B = Bush.

Light Red, Dark Red and White Kidney, Great Northern and Cranberry Bean Variety Descriptions.

Class and Cultivar	Origin	RM[1]	Plant Type[2]
LIGHT RED KIDNEY			
Big Red	Provita	ML	B
California Early (CELRK)	U. Calif.	E	B
Foxfire	Rogers	ME	B
OAC Inferno	U. of Guelph	ML	B
Pink Panther	Seminis	M	B
Ronnie's Red	Provita	ML	B
Rosie	NDSU	L	B
DARK RED KIDNEY			
Cabernet	Seminis	ML	B
Chaparral	Provita	ML	B
Dynasty	U. of Guelph	ML	B
Epic	Provita	ML	B
GTS-104	GenTec	M	B
Montcalm	MSU	ML	B
Red Rover	Seminis	ME	B
Redhawk	MSU	M	B
Talon	NDSU	M	B
WHITE KIDNEY			
Beluga	MSU	M	B
COB 212-03	GenTec	M	B
Snowdon	MSU	ME	B
GREAT NORTHERN			
Aries	Provita	ME	USV
Draco	Provita	M	USV
Matterhorn	MSU	ME	USV
Orion	Provita	E	V
Powderhorn	MSU	M	USV
Taurus	Kelly Bean Co.	L	USV
CRANBERRY			
CR 318-6	Meridian	M	B

[1]RM = Relative Maturity; E = Early; ME = Medium Early; M = Medium; ML = Medium Late; L = Late.

[2]V = Vine; UV = Upright Vine; USV = Upright Short Vine; B = Bush.

NDSU North Central Research Extension Center
2017 Dry Edible Bean Variety Trial at Minot

Variety	Market Type	Days to Mature	Plant Height	Lodging	100 Seed wt.	Seed Yield				
						2015	2016	2017	2 year	3 year
		DAP*	inches	0-9**	grams	pounds per acre				
Lariat	Pinto	110	16	6	39	3293	3024	2198	2611	2838
Windreaker	Pinto	108	13	6	39	3002	2922	1558	2240	2494
LaPaz	Pinto	110	17	1	39	2940	2554	1578	2066	2357
Maverick	Pinto	107	12	7	36	2474	2648	1948	2298	2357
Stampede	Pinto	112	15	5	37	2222	2731	1527	2129	2160
Monterrey	Pinto	109	17	2	40	--	2986	2105	2546	--
Palomino	Pinto	109	14	5	37	--	2519	2092	2305	--
T9905	Navy	112	15	3	18	2066	2582	2123	2353	2257
Vista	Navy	115	14	4	16	2412	2131	1800	1966	2114
Ensign	Navy	117	14	4	19	2108	2639	1447	2043	2065
HMS Medalist	Navy	114	16	3	17	--	--	1411	--	--
Eclipse	Black	111	18	2	18	2430	2759	2509	2634	2566
Zorro	Black	108	16	1	19	2443	2356	1748	2052	2182
Loreto	Black	116	16	3	18	2239	1803	1988	1895	2010
Merlot	Small Red	112	14	4	32	2109	2627	1459	2043	2065
Powderhorn	Great Northern	109	14	3	33	--	--	1551	--	--
Rosetta	Pink	112	17	2	29	--	2087	2865	2476	--
Trial Mean		111	15	4	29	--	2427	1876	--	--
C.V. %		1.3	13.3	37	3.9	--	9.0	8.0	--	--
LSD 5%		2	3	2	2	--	359	250	--	--
LSD 10%		2	3	2	2	--	299	207	--	--

**DAP = Days after planting.* ***Lodging: 0 = none, 9 = lying flat on the ground*

Planting Date: May 17
Harvest Date: September 30
Seeding Rate: 100,000 live seeds / Acre
Row Spacing: 15"
Previous Crop: 2014 & 2015 = spring wheat, 2016 = barley
Tillage System: Minimum till
Soil Type: Williams Loam

NDSU North Central Research Extension Center
2017 Faba Bean Variety Trial at Minot

Variety	Seedling Emergence	Seedling Plant Stand	Harvest Plant Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod
	DAP[1]	#/sq ft	#/sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches
Fanfare	13	4.8	4.8	47	73	93	21	0	9
Tabasco	13	4.1	4.1	48	72	92	21	0	7
Boxer	13	4.8	4.4	46	72	93	22	0	8
Fabelle	13	5.8	5.1	47	72	91	20	0	9
Trial Mean	13	4.9	4.6	47	72	92	21	0	8
C.V.%	0.0	19	20	2.7	1.3	1.8	9.9	0.0	12.2
LSD 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
LSD 10%	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1] *DAP = Days after planting.* *NS = no statistical difference between varieties.*

Variety	Grain Protein	Test Weight	1000 KWT	Seed Yield			Average Yield	
				2015	2016	2017	2 year	3 year
	%	lbs/bu	g	pounds per acre				
Fanfare	25.5	58.9	462	5045	5537	1798	3667	4127
Tabasco	22.8	55.8	363	3952	5330	1653	3492	3645
Boxer	24.6	57.8	472	4837	6100	2079	4090	4339
Fabelle	26.3	56.6	429		4462	1915	3189	
Trial Mean	24.8	57.3	432	4359	5402	1861	--	--
C.V.%	1.4	1.1	5.6	6.0	3.4	19.9	--	--
LSD 5%	0.7	1.3	48	395	324	NS	--	--
LSD 10%	0.5	1.0	38	325	265	NS	--	--

Trial was planted on April 28 with a seeding rate of 200,000 pls/A and harvested on August 28.
Previous Crop: 2014 & 2015 = Spring wheat, 2016 = canola
Tillage System: Transitional No-till (2nd year)
Soil Type: Williams Loam
Note: The 2017 trial sustained severe drought.

NDSU North Central Research Extension Center
2017 Faba Bean Seeding Date Trial at Minot

Seeding Date	Variety	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
		DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
April 12	Tabasco	20	4.6	3.9	59	86	102	18	0	7	23.0	56.8	367	799
April 28	Tabasco	13	3.3	3.6	46	73	90	20	0	7	23.1	57.5	326	982
May 10	Tabasco	11	3.7	3.8	45	69	85	20	0	7	23.3	57.2	329	832
May 24	Tabasco	11	2.9	2.9	42	63	84	21	0	8	22.7	57.8	358	646
April 12	Boxer	20	3.6	4.8	59	85	102	19	0	6	25.0	57.5	467	1576
April 28	Boxer	13	4.7	4.4	45	73	90	25	0	9	24.9	57.9	465	1670
May 10	Boxer	11	3.4	4.4	43	69	87	25	0	8	24.8	57.7	417	1053
May 24	Boxer	11	2.6	3.5	42	65	85	18	0	9	25.2	57.2	461	698
Trial Mean		14	3.6	3.9	48	73	91	21	0	8	24.0	57.5	399	1032
C.V.%		0.0	22.0	15.6	0.9	0.7	2.2	11.0	0	6.7	2.9	0.6	3.0	27.4
LSD 5%		1	1.4	1.1	1	1	4	4	NS	1	1.2	0.6	21	496
LSD 10%		1	1.1	0.9	1	1	3	3	NS	1	1.0	0.5	17	406

Combined Means

Seeding Date	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield	Harvest Date
	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A	
April 12	20	4.1	4.3	59	86	102	18	0	7	24.0	57.2	417	1188	Aug 28
April 28	13	4.0	4.0	46	73	90	23	0	8	24.0	57.7	396	1326	Aug 28
May 10	11	3.6	4.1	44	69	86	22	0	8	24.1	57.4	373	943	Aug 28
May 24	11	2.7	3.2	42	64	85	19	0	8	24.0	57.5	410	672	Aug 28
LSD 5%	1	1.0	0.8	1	1	2	3	NS	NS	NS	NS	NS	479	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.* *NS = no statistical difference between treatments.*

Planting Rate: 175,000 PLS/A Row Spacing: 7.5" *Previous Crop: Canola*

Soil Type: Williams Loam *Tillage System: Transitional No-till (2nd year)*

Note: Grain protein, test weight and seed yield have been adjusted to 16% moisture.

Summary: Faba beans are a cool season legume that are known to tolerate cold soils and frost. The objectives of this trial were to observe and document agronomic characteristics, seed quality and seed yield of two varieties that were planted at 2 week intervals over a period of a month and a half. As would be expected, statistically significant genetic by environmental interactions were recorded on most characteristics observed. Although seedling emergence took 20 days for the first seeding date, this delay did not result in any additional seed mortality compared to other seeding dates. Plants tended to initiate flowering sooner as seeding date was delayed and had a shorter duration of flowering which probably contributed to the declining yield trend. Plants tended to grow taller as planting dates were delayed and the first seed pod also tended to be higher off the ground. There was a declining trend for seed yield with delayed seeding although the first three dates produced statistically similar yields. The trial sustained severe drought which impacted overall agronomic characteristics, seed quality and seed yields.

NDSU North Central Research Extension Center
2017 Faba Bean Seeding Rate Trial at Minot

Variety	Seeding Rate	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
	Seeds/sq ft	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
Tabasco	3	13	2.5	3.3	49	73	94	20	0	7	20.6	57.7	367	1002
Tabasco	4	13	4.1	3.5	49	73	94	20	0	7	20.5	57.6	344	1325
Tabasco	5	13	5.2	4.4	48	72	93	18	0	7	21.5	57.4	361	1310
Tabasco	6	13	4.6	3.2	49	72	93	19	0	7	21.1	56.6	349	1274
Boxer	3	13	4.1	3.1	46	73	94	20	0	8	22.7	57.8	403	1478
Boxer	4	13	3.7	3.9	47	73	93	21	0	7	24.1	57.1	458	1777
Boxer	5	13	4.5	4.0	45	73	93	21	0	8	24.1	57.2	429	1675
Boxer	6	13	3.7	4.6	45	72	92	21	0	9	22.5	57.7	437	2048
Trial Mean		13	4.1	3.7	47	73	93	20	0	8	22.1	57.4	394	1486
C.V.%		0.0	20.9	17.4	1.1	0.6	1.5	9.7	0	13.5	2.4	1.4	2.9	16.0
LSD 5%		NS	1.5	1.1	1	NS	NS	NS	NS	NS	0.9	NS	20	416
LSD 10%		NS	1.2	0.9	1	NS	NS	NS	NS	1	0.8	1.1	17	342

Combined Means

Seeding Rate	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
Seeds/sq ft	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
3	13	3.3	3.2	48	73	94	20	0	8	21.7	57.7	385	1240
4	13	3.9	3.7	48	73	94	21	0	7	22.3	57.3	401	1551
5	13	4.9	4.2	47	73	93	19	0	7	22.8	57.3	395	1493
6	13	4.2	3.9	47	72	93	20	0	8	21.8	57.1	393	1661
LSD 5%	NS	1.1	0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.* *NS = no statistical difference between treatments.*

Planting Date: April 28 *Harvest Date: August 28* Row Spacing: 7.5"

Previous Crop: Canola *Tillage System: Transitional No-till (2nd year)* *Soil Type: Williams Loam*

Note: Grain protein, test weight and seed yield have been adjusted to 16% moisture.

Summary: Faba beans are large seeded crop, requiring a large volume of seed to be planted, thus restricting the planting speed and number of acres that can be planted in a day. Results of this trial would indicate that seeding rates higher than 4 seeds per square foot do not impact agronomic characteristics, seed quality or yield. The trial sustained a severe drought which did affect agronomic characteristics, seed quality and seed yields.

NDSU North Central Research Extension Center
2017 Roundup Ready Alfalfa Variety Trial at Minot

Company	Variety	Fall Dormancy	Winter Hardiness	Plant Stand[3]	Plant Height	Harvest Moisture	Total Yield 2017	2016	2015	Average	Vernal
		1 - 11[1]	1 - 6[2]	%		%	Tons / acre[4]				%
Common	Vernal	2	1	99	21	61	1.31	1.96	0.56	1.28	100
Pioneer	54QR04	4	2	99	22	64	1.15	2.03	0.59	1.26	98
Legend	MegaMaxx	4	2	96	18	61	1.10	1.97	0.51	1.19	93
Monsanto	DKA 44-16	4	2	99	20	63	0.94	2.11	0.46	1.17	91
Monsanto	DKA 40-51	4	2	92	19	63	0.85	2.00	0.45	1.10	86
Croplan	Stratica	4	2	99	19	60	0.87	1.78	0.57	1.07	84
Croplan	Presteez	3	1	99	19	63	0.93	1.83	0.41	1.06	83
Allied	428	4	1	87	19	61	0.88	1.78	0.43	1.03	80
Integra	8444	4	--	99	16	63	0.77	1.78	0.54	1.03	80
Trial Mean				96	19	62	0.98	1.91	0.50	--	--
C.V.%				9.2	13.7	6.2	17.3	9.3	17.6	--	--
LSD 0.05				NS	NS	NS	0.25	NS	0.13	--	--

2017 Alfalfa Variety Trial at Minot

Company	Variety	Fall Dormancy	Winter Hardiness	Plant Stand[3]	Plant Height	Harvest Moisture	Total Yield 2017	2016	2015	Average	Vernal
		1 - 11[1]	1 - 6[2]	%		%	Tons / acre[4]				%
Allied	Ladak II	2	2	99	24	62	1.49	2.17	0.56	1.41	106
Millborn	Persist III	4	2	99	21	62	1.45	2.09	0.65	1.40	105
Dow	AFX 457	4	2	99	25	64	1.17	2.33	0.67	1.39	105
Allied	FSG 329	3	2	98	23	64	1.21	2.24	0.71	1.39	104
Pioneer	54B66	4	--	98	26	64	1.27	2.11	0.68	1.35	102
Common	Vernal	2	1	99	24	63	1.30	2.06	0.63	1.33	100
Millborn	Phirst Extra Hyb	4	2	96	20	61	1.16	2.10	0.66	1.31	98
Dow	HybriForce-3400	4	2	93	20	63	1.22	2.00	0.55	1.26	95
Dyna-Gro	DG4210	4	1	97	23	63	1.20	1.98	0.59	1.26	94
Croplan	LegenDairy	3	1	99	18	62	1.32	1.87	0.52	1.24	93
Pioneer	55V50	5	--	95	22	63	1.17	1.96	0.56	1.23	92
Integra	8420	4	--	98	19	62	1.00	2.04	0.52	1.19	89
Dow	AFX 469	4	2	99	22	61	1.01	1.91	0.60	1.17	88
Legend	Crave	4	2	99	21	61	0.99	1.94	0.57	1.17	88
Pioneer	55Q27	5	--	94	21	62	1.07	1.77	0.54	1.13	85
Dow	AFX 429	4	2	98	19	61	1.01	1.80	0.52	1.11	83
Dow	4A420	4	2	99	18	61	0.83	1.92	0.55	1.10	83
Trial Mean				98	22	62	1.17	2.02	0.59	--	--
C.V.%				3.6	36.0	5.7	29.4	20.4	10.1	--	--
LSD 0.05				NS	NS	NS	NS	0.17	0.29	--	--

[1] Fall Dormancy: 1 = very dormant, 11 = very non dormant (see description below).
[2] Winter Hardiness: 1 = extremely winterhardy, 6 = non-winterhardy.
[3] Plant Stand: Visual estimation of winter survival.
[4] Yields are stated on a 0% moisture basis.
NS = no statistical difference between varieties.

Planting Date: May 28, 2015 *Harvest Date: June 28* *Soil Type: Williams Loam*

Note: The 2017 trial sustained severe drought.
Fall dormancy is the ability of alfalfa to grow tall in the fall. It is measured by determining plant height about 25 days after a fall cutting is taken following a spring planting. The advantage of growing less fall dormant varieties is higher yields.