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North Dakota Alternative Broadleaf Crop Variety Trial Results for 2016 and Selection Guide

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This publication contains information on selected varieties of **flax, lentil, safflower, chickpea and faba bean** that North Dakota State University tested in 2016. Table 1 lists crop acreage during the past eight years. Additional varieties of these crops may have been tested but are not listed. Although alternative crops may have been tested across the state, adaptation may be limited to specific regions.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. The LSD (least significant difference) numbers beneath the columns in tables are derived from the statistical analyses and only apply to the numbers in the column in which they appear.

If the difference between two varieties exceeds the LSD value, it means that with 95 or 90 percent (LSD 0.05 or 0.10) probability, the higher-yielding variety has a significant yield advantage. If the difference between two varieties is less than the LSD value, then the variety yields are considered similar.

The abbreviation NS indicates that no significant difference was found for that trait among any of the varieties. The CV is a measure of variability in the trial. The CV stands for coefficient of variation and is expressed as a percentage. Large CVs mean a large amount of variation that could not be attributed to differences in the varieties. In the tables, the mean indicates the average of the observations in the column.

When selecting a high-yielding and good-quality variety, use data that summarizes several years and locations. Choose the variety that, on average, performs the best at multiple locations near you during several years. Presentation of data for the entries tested does not imply approval or endorsement by the authors conducting the test.

Table 1. Alternative Broadleaf Crop Acres[1], North Dakota, 2009-16.

Crop	2016	2015	2014	2013	2012	2011	2010	2009	8-year average
Flax	295,000	403,210	260,150	146,770	303,450	148,200	381,510	286,060	278,040
Lentil	255,000	162,990	72,950	126,050	152,150	74,710	260,260	161,930	158,260
Safflower	9,700	10,170	13,290	14,930	14,170	2,380	15,230	19,280	12,390
Chickpea	10,600	7,000	6,180	9,400	11,040	3,980	15,630	19,830	10,460
Faba bean	—[2]	720	1,320	—	—	—	—	—	—

[1] Farm Service Agency reported acreage.
[2] Data not available.

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Contact the NDSU Extension Service or Research Extension Center offices for more detailed and site-specific information on alternative crop variety performance and production recommendations.

Crop variety data are available in electronic format at *www.ag.ndsu.edu/varietytrials*.

Weather data are available at *www.ndsu.edu/ndawn*.

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FLAX

Table 2. Flax Trial Planting and Harvest Dates, North Dakota 2016.

Location	Plant	Harvest
Carrington	May 10	August 24
Hettinger	April 13	August 16
Langdon	May 9	September 2
Minot	May 17	August 29
Williston - dryland	April 23	August 16
Williston - irrigated	April 21	August 15

Table 3. Flax Variety Descriptions.

Variety[1]	Origin[2]	Year Released	Relative Maturity	Seed Color	Plant Height	Wilt[3]
Bison	ND	1926	Med.	Brown	Med.	MR
Carter	ND	2004	Med.	Yellow	Med.	MS/MR
Cathay	ND	1998	Med.	Brown	Med.	MR
CDC Arras	Can.	1999	Med.	Brown	Med.	MR
CDC Bethune	Can.	1999	Med.late	Brown	Med.tall	MR
CDC Glas	Can.	2012	Med.	Brown	Med.tall	MR
CDC Mons	Can.	2003	Med.late	Brown	Med.	MR
CDC Neela	Can.	2013	Med.late	Brown	Med.	MR
CDC Plava	Can.	2015	Med.	Brown	Med.	MR
CDC Sanctuary	Can.	2012	Med.	Brown	Med.tall	MR
CDC Sorrel	Can.	2007	Med.late	Brown	Med.tall	MR
Gold ND	ND	2014	Med.	Yellow	Med.tall	MR/R
Hanley	Can.	2002	Med.early	Brown	Med.	R
Lightning	Can.	2002	Late	Brown	Med.tall	R
Linott	Can.	1966	Med.early	Brown	Med.	MS/MR
McGregor	Can.	1980	Late	Brown	Med.tall	MR
Neche	ND	1988	Med.	Brown	Med.	MR/R
Nekoma	ND	2002	Late	Brown	Med.	MR
Omega	ND	1989	Med.	Yellow	Med.	MS/MR
Pembina	ND	1998	Med.	Brown	Med.	MR
Prairie Blue	Can.	2003	Med.late	Brown	Med.tall	MR
Prairie Grande	Can.	2008	Med.early	Brown	Med.	MR
Prairie Sapphire	Can.	2012	Med.	Brown	Med.	MR
Prairie Thunder	Can.	2006	Med.	Brown	Short	MR
Rahab 94	SD	1994	Med.	Brown	Med.	MR
Selby	SD	2000	Late	Brown	Tall	MR
Shape	Can.	2010	Med.	Brown	Med.	R
TAM F-201	TX	1974	Med.late	Yellow	Med.tall	NA
Webster	SD	1998	Late	Brown	Tall	MR
York	ND	2002	Late	Brown	Med.	MR/R

[1] All varieties have resistance to prevalent races of rust; all have good oil yield and oil quality.

[2] Can. = Canada; ND = North Dakota State University; SD = South Dakota State University.

[3] R = resistant; MR = moderately resistant; MS = moderately susceptible, NA not available.

Table 4. Yield of Flax Varieties at Six Locations in North Dakota, 2014-2016.

	Carrington		Langdon		Minot		Williston		Williston-Irr.		Hettinger		Average N.D.[2]	
Variety	**2016**	**3 Yr.**	**2016**	**3 Yr.**	**2016**	**3 Yr.**	**2016**	**3 Yr.**	**2016**	**2 Yr.**	**2016**	**3 Yr.**	**2016**	**3 Yr.**
	('bushels/acre)													
Carter[1]	21.2	27.5	39.6	38.5	30.7	25.9	22.2	23.6	46.0	39.3	18.2	27.7	26.4	28.6
CDC Bethune	16.4	26.5	38.6	38.4	24.3	21.8	22.1	22.7	--	--	19.1	27.3	24.1	27.4
CDC Glas	17.7	27.8	40.5	41.5	26.9	24.9	22.4	23.9	56.7	52.7	21.1	30.6	25.7	29.7
CDC Neela	19.7	28.8	37.2	38.4	25.6	--	24.5	--	--	--	21.6	31.8	25.7	--
CDC Plava	17.8	--	30.9	--	19.2	--	25.0	--	--	--	--	--	--	--
CDC Sanctuary	18.5	26.8	33.4	37.6	26.7	26.0	26.9	24.5	--	--	22.5	31.1	25.6	29.2
CDC Sorrel	18.4	28.8	33.7	37.3	26.6	26.1	25.0	24.6	49.0	--	21.4	29.0	25.0	29.2
Gold ND[1]	20.8	29.3	38.2	37.3	27.6	26.2	23.6	24.3	46.3	--	19.4	28.4	25.9	29.1
Neche	17.5	26.0	--	--	--	--	--	--	--	--	--	--	--	--
Nekoma	20.9	28.6	38.2	38.0	28.8	25.7	22.6	23.3	--	--	19.3	28.3	26.0	28.8
Omega[1]	13.1	21.4	32.9	34.9	23.8	22.9	18.6	22.3	--	--	19.4	25.9	21.6	25.5
Pembina	17.0	25.0	37.5	37.5	26.3	24.7	22.6	22.3	--	--	17.6	26.5	24.2	27.2
Prairie Blue	13.8	22.1	39.9	39.1	20.1	20.7	22.7	23.9	50.2	45.0	19.2	29.1	23.1	27.0
Prairie Grande	17.6	26.0	42.3	38.1	21.7	21.4	22.4	22.3	--	--	19.7	28.6	24.7	27.3
Prairie Sapphire	17.7	25.9	34.9	37.2	15.7	19.4	23.3	22.5	--	--	19.9	28.0	22.3	26.6
Prairie Thunder	19.0	25.6	38.9	39.3	26.1	25.3	22.8	22.8	--	--	18.9	26.7	25.1	27.9
Rahab 94	18.5	27.1	40.0	39.1	25.3	25.9	23.4	23.5	--	--	17.8	28.4	25.0	28.8
Shape	18.9	26.1	43.6	40.5	22.4	22.3	23.5	22.4	--	--	18.7	27.8	25.4	27.8
Webster	21.8	27.9	39.9	37.9	28.0	25.1	23.7	22.5	47.6	44.5	20.1	27.5	26.7	28.2
York	14.5	26.6	40.9	38.1	23.9	22.2	20.9	22.1	46.6	--	19.4	28.3	23.9	27.5
Mean	18.0	26.5	37.9	38.3	24.7	23.9	23.1	23.1	48.9	45.4	19.6	28.4	24.8	28.0
CV %	10	-	7.3	5.8	12.4	13.3	11.1	5.9	10.0	--	9.6	5.3	9.5	5.0
LSD 0.05	2.5	--	4.0	3.7	5.0	5.3	3.6	2.3	8.6	--	2.7	2.5	3.0	1.8
LSD 0.10	2.1	--	3.3	3.1	4.2	4.4	3.0	1.9	7.1	--	2.2	2.1	2.5	1.5

[1]Yellow seeded.

[2]Average 2016 and 3-year average is from the five dryland trials.

Table 5. Flax Days to Flower, North Dakota, 2016.

Variety	Carrington	Langdon	Williston	Williston-Irrigated	Hettinger	Minot	Average N.D.[1]
				(days after planting)			
Carter[2]	47	50	52	55	63	53	53
CDC Bethune	48	50	52	--	62	52	53
CDC Glas	45	51	53	54	63	55	53
CDC Neela	46	50	52	--	61	55	53
CDC Plava	45	49	53	--	--	50	--
CDC Sanctuary	44	50	53	--	63	54	53
CDC Sorrel	46	51	54	57	63	55	54
Gold ND[2]	48	52	53	57	63	55	54
Neche	44	--	--	--	--	--	--
Nekoma	47	49	52	--	63	52	53
Omega[2]	47	51	54	--	63	52	53
Pembina	47	50	52	--	63	54	53
Prairie Blue	43	50	53	55	64	54	53
Prairie Grande	46	49	52	--	63	50	52
Prairie Sapphire	44	51	53	--	63	50	52
Prairie Thunder	45	51	53	--	64	53	53
Rahab 94	46	49	52	--	62	53	52
Shape	45	50	53	--	63	49	52
Webster	50	50	52	54	62	55	54
York	46	49	52	53	63	52	52
Mean	46	50	53	55	63	53	53
CV %	1.6	1.7	0.8	1.4	1.1	1.7	2.3
LSD 0.05	1.1	1.2	0.6	2.4	1.0	2.0	1.6
LSD 0.10	0.9	1.0	0.5	2.0	0.8	1.0	1.3

[1]Average of the five dryland trials.
[2]Yellow seeded.

Table 6. Flax Test Weight and Oil Content, North Dakota, 2016.

	Carrington		Langdon	Williston		Williston-Irr.		Hettinger		Minot		Average N.D.[1]	
Variety	**Test Wt.**	**Oil**	**Test Wt.**	**Test Wt.**	**Oil**	**Test Wt.**	**Oil**	**Test Wt.**	**Oil**	**Test Wt.**	**Oil**	**Test Wt.**	**Oil**
	(lb/bu)	(%)	(lb/bu)	(lb/bu)	(%)	(lb/bu)	(%)	(lb/bu)	(%)	(lb/bu)	(%)	(lb/bu)	(%)
Carter[2]	52.4	42.5	52.1	53.9	37.0	54.8	33.5	54.9	45.0	53.8	42.9	53.4	41.9
CDC Bethune	50.4	42.1	52.2	54.0	36.4	--	--	56.9	44.8	54.0	43.7	53.5	41.7
CDC Glas	50.2	43.0	50.8	52.8	37.9	53.7	34.5	56.5	46.7	52.3	43.8	52.5	42.9
CDC Neela	51.5	43.2	51.4	53.8	36.1	--	--	56.0	45.9	53.1	43.8	53.2	42.2
CDC Plava	51.9	44.8	51.4	53.5	37.2	--	--	--	--	52.9	44.3	--	--
CDC Sanctuary	51.6	43.3	51.0	53.6	37.6	--	--	56.6	45.8	53.2	43.9	53.2	42.6
CDC Sorrel	49.9	42.9	51.2	53.6	37.1	54.2	34.1	56.7	45.9	53.3	44.3	52.9	42.6
Gold ND[2]	52.9	44.0	52.1	54.3	37.3	55.0	33.6	56.9	46.0	54.3	45.0	54.1	43.1
Neche	51.7	42.9	--	--	--	--	--	--	--	--	--	--	--
Nekoma	51.3	42.7	52.1	53.8	37.1	--	--	56.2	45.5	53.1	44.2	53.3	42.4
Omega[2]	50.5	42.8	52.2	54.3	37.1	--	--	57.5	44.8	53.2	42.9	53.5	41.9
Pembina	50.6	43.2	51.2	53.8	37.6	--	--	55.8	46.2	53.1	44.5	52.9	42.9
Prairie Blue	50.4	43.9	51.4	53.6	37.9	54.2	34.1	56.7	46.8	52.3	43.6	52.9	43.0
Prairie Grande	49.8	43.4	51.6	53.7	36.7	--	--	55.8	45.8	51.6	44.2	52.5	42.6
Prairie Sapphire	49.9	42.9	50.8	53.1	38.2	--	--	56.3	48.0	50.8	44.1	52.2	43.3
Prairie Thunder	51.9	42.4	52.2	53.9	35.6	--	--	56.5	45.7	53.7	43.0	53.6	41.7
Rahab 94	51.4	43.8	51.5	53.3	37.2	--	--	56.6	46.8	52.3	43.7	53.0	42.9
Shape	49.8	41.5	51.4	53.5	37.6	--	--	56.7	47.0	53.1	44.2	52.9	42.6
Webster	51.3	42.9	52.6	54.0	37.6	54.7	34.0	56.0	46.3	53.8	44.2	53.5	42.7
York	50.1	42.4	51.7	54.0	36.0	54.6	33.2	57.1	45.6	53.5	43.4	53.3	41.8
Mean	51.0	43.0	51.6	53.7	37.1	54.5	33.9	56.4	46.0	53.0	43.9	53.1	42.5
CV %	2.6	1.8	0.8	0.3	2.8	0.6	2.0	1.1	1.7	1.0	1.3	1.1	1.3
LSD 0.05	1.8	1.1	0.6	0.2	1.5	0.6	1.2	0.9	1.1	0.9	0.9	0.7	0.8
LSD 0.10	1.5	0.9	0.5	0.2	1.2	0.5	1.0	0.7	0.9	0.7	0.8	0.6	0.6

[1]Test weight average of the five dryland trials and oil average of four dryland trials.

[2]Yellow seeded.

LENTIL

Table 7. Lentil trial planting and harvest dates, and previous crop, North Dakota, 2016.

Location	Planting Date	Harvest Date	Previous Crop
Dickinson	May 5	August 4	Rye
Hettinger	April 15	August 1	Pea
Minot	April 30	August 15	Spring Wheat
Williston-Dryland	May 5	August 9 & 11	Barley

Table 8. Lentil Yield Across Locations, North Dakota, 2016.

Variety	Seed Coat Color	Market Type	Average Yield Across Locations (% of CDC Richlea)	
			2016	2 Year[1]
Avondale	Green	Medium	--	--
CDC Greenland	Green	Large	85	86
CDC LeMay	French Green	Small	73	79
CDC Redberry	Red	Small	83	91
CDC Red Rider	Red	Small	103	99
CDC Richlea	Green	Medium	100	100
CDC Rosetown	Red	Extra Small	84	88
CDC Rouleau	Red	Small	110	103
CDC Viceroy	Green	Small	95	99
Eston	Green	Small	--	--
ND Eagle	Green	Small	--	--
Pardina	Pardina	Small	--	--
Pennell	Green	Large	87	82
Riveland	Green	Large	82	82

[1]2015 and 2016.

Table 9. Lentil Seed Yield, North Dakota, 2016.

Variety	Dickinson	Hettinger	Minot	Williston	2016 Average
				(lb/acre)	
French Green					
CDC LeMay	1,315	598	1,206	1,814	1,233
Green					
Avondale	--	1,164	1,386	2,241	--
CDC Greenland	971	1,219	1,464	2,119	1,443
CDC Richlea	1,584	1,299	1,704	2,209	1,699
CDC Viceroy	1,521	1,352	1,674	1,940	1,622
Eston	--	867	1,290	1,628	--
ND Eagle	--	890	1,854	2,051	--
Pennell	1,302	1,079	1,374	2,182	1,484
Riveland	1,124	1,118	1,200	2,156	1,400
Pardina					
Pardina	--	645	954	1,889	--
Red					
CDC Redberry	1,229	902	1,614	1,874	1,405
CDC Red Rider	1,585	1,359	1,674	2,386	1,751
CDC Rosetown	1,406	1,304	1,254	1,732	1,424
CDC Rouleau	1,511	1,157	2,202	2,576	1,862
Mean	1,355	1,068	1,489	2,057	1,532
CV %	9.0	11.8	17.7	7.4	12.6
LSD 0.10	147	145	228	177	233

Table 10. Lentil Days to Flowering, North Dakota, 2016.

Variety	Dickinson	Hettinger	Minot	Williston	2016 Average
	(days after planting)				
French Green					
CDC LeMay	49	61	54	53	54
Green					
Avondale	--	61	53	49	--
CDC Greenland	49	61	55	53	55
CDC Richlea	49	61	53	51	54
CDC Viceroy	48	--	53	49	--
Eston	--	61	52	49	--
ND Eagle	--	61	51	48	--
Pennell	49	61	53	50	53
Riveland	48	61	52	48	52
Pardina					
Pardina	--	61	52	48	--
Red					
CDC Redberry	49	61	54	51	54
CDC Red Rider	49	61	56	52	55
CDC Rosetown	49	61	57	54	55
CDC Rouleau	50	61	55	51	54
Mean	49	61	54	50	54
CV %	0.7	0.6	2.6	2.0	1.9
LSD 0.10	0	0.4	1	1.2	1.2

Table 11. Lentil Canopy Height, North Dakota, 2016.

Variety	Dickinson	Hettinger	Williston	2016 Average
	(inches)			
French Green				
CDC LeMay	9	10	11	10
Green				
Avondale	--	12	13	--
CDC Greenland	10	12	13	12
CDC Richlea	9	11	12	11
CDC Viceroy	9	--	12	--
Eston	--	10	10	--
ND Eagle	--	9	11	--
Pennell	9	10	11	10
Riveland	9	13	12	11
Pardina				
Pardina	--	9	9	--
Red				
CDC Redberry	9	11	12	11
CDC Red Rider	9	11	12	11
CDC Rosetown	9	10	13	11
CDC Rouleau	9	11	13	11
Mean	9	11	12	11
CV %	7.0	7.4	10.1	6
LSD 0.10	1	1	1	1

Table 12. Lentil Test Weight, North Dakota, 2016.

Variety	Dickinson	Hettinger	Minot	Williston	2016 Average
			(lb/bu)		
French Green					
CDC LeMay	64.0	61.4	62.4	63.4	62.8
Green					
Avondale	--	59.5	60.5	61.9	--
CDC Greenland	58.0	58.6	58.1	59.9	58.7
CDC Richlea	63.2	60.4	60.3	62.1	61.5
CDC Viceroy	64.9	62.4	62.2	63.3	63.2
Eston	--	61.8	62.2	63.7	62.6
ND Eagle	--	--	61.9	62.8	--
Pennell	59.8	58.0	57.9	59.9	58.9
Riveland	63.3	57.4	57.5	60.0	59.6
Pardina					
Pardina	--	61.2	62.6	64.1	--
Red					
CDC Redberry	65.1	61.5	61.8	62.6	62.8
CDC Red Rider	62.9	61.4	61.8	62.9	62.3
CDC Rosetown	64.2	63.1	63.0	63.5	63.5
CDC Rouleau	62.4	60.5	61.4	62.7	61.8
Mean	62.8	60.6	61.0	62.3	61.6
CV %	3.5	1.0	0.9	0.3	1.4
LSD 0.10	2.6	0.7	0.5	0.2	1.0

Table 13. Lentil Seeds/lb, North Dakota, 2016.

Variety	Dickinson	Hettinger	Minot	Williston	2016 Average
	(seeds/lb)				
French Green					
CDC LeMay	13,196	11,788	12,865	14,632	13,120
Green					
Avondale	--	8,574	9,998	9,257	--
CDC Greenland	7,799	6,930	7,766	7,436	7,483
CDC Richlea	9,338	8,898	10,209	10,309	9,688
CDC Viceroy	12,744	--	14,217	14,175	--
Eston	--	11,788	14,265	13,745	--
ND Eagle	--	10,812	12,135	12,259	--
Pennell	8,793	6,794	7,631	7,316	7,634
Riveland	6,480	6,393	6,804	6,300	6,494
Pardina					
Pardina	--	10,309	12,360	11,063	--
Red					
CDC Redberry	10,528	9,553	11,322	11,631	10,758
CDC Red Rider	10,497	9,261	9,962	10,800	10,130
CDC Rosetown	15,569	12,639	16,665	16,200	15,268
CDC Rouleau	11,496	11,205	13,556	12,960	12,304
Mean	10,644	9,611	11,411	11,292	10,320
CV %	10.4	3.8	4.5	2.6	6.8
LSD 0.10	1,328	432	474	349	851

Table 14. Clearfield Lentil Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2016.

Location	Planting Date	Harvest Date	Previous Crop
Hettinger	April 15	August 1	Field Pea
Minot	April 30	August 15	Spring Wheat
Williston	May 6	August 11	Barley

Table 15. Clearfield Lentil Seed Yield, North Dakota, 2016.

Variety	Hettinger	Minot	Williston	3-location Average
	(lb/acre)			
French Green				
CDC Peridot-CL	1,483	--	1,743	--
Green				
CDC Imigreen-CL	1,601	1,272	2,038	1,637
CDC Impress-CL	1,705	1,656	1,705	1,689
CDC Imvincible-CL	1,925	2,070	2,241	2,079
Red				
CDC Dazil-CL	1,623	--	2,057	--
CDC Impala-CL	1,710	1,446	1,514	1,557
CDC Proclaim-CL	1,741	--	1,974	--
CDC Maxim-CL	1,601	2,334	1,739	1,891
Mean	1,674	1,756	1,876	1,770
CV %	8.6	14.8	7.7	16.0
LSD 0.10	174	330	175	429

Table 16. Clearfield Lentil Days to Flowering, North Dakota, 2016.

Variety	Hettinger	Williston	2-location Average
	(days after planting)		
French Green			
CDC Peridot-CL	61	47	54
Green			
CDC Imigreen-CL	61	50	56
CDC Impress-CL	61	50	56
CDC Imvincible-CL	61	50	56
Red			
CDC Dazil-CL	61	50	56
CDC Impala-CL	61	53	57
CDC Proclaim-CL	61	51	56
CDC Maxim-CL	61	51	56
Mean	61	50	56
CV %	0.6	2.5	2.1
LSD 0.10	0	1.5	2.2

Table 17. Clearfield Lentil Canopy Height, North Dakota, 2016.

Variety	Hettinger	Williston	2-location Average
	(inches)		
French Green			
CDC Peridot-CL	10	8	9
Green			
CDC Imigreen-CL	12	12	12
CDC Impress-CL	11	11	11
CDC Imvincible-CL	10	12	11
Red			
CDC Dazil-CL	10	10	10
CDC Impala-CL	10	11	11
CDC Proclaim-CL	9	10	10
CDC Maxim-CL	10	10	10
Mean	10	11	10
CV %	6.0	10.2	8.0
LSD 0.10	0.7	1.3	1.6

Table 18. Clearfield Lentil Test Weight, North Dakota, 2016.

Variety	Hettinger	Minot	Williston	3-location Average
			(lb/bu)	
French Green				
CDC Peridot-CL	62.3	--	63.5	--
Green				
CDC Imigreen-CL	60.0	59.6	61.5	60.4
CDC Impress-CL	60.1	60.0	61.6	60.6
CDC Imvincible-CL	62.1	61.9	63.3	62.4
Red				
CDC Dazil-CL	61.2	--	63.1	--
CDC Impala-CL	62.8	62.7	63.7	63.1
CDC Proclaim-CL	60.8	--	63.0	--
CDC Maxim-CL	61.7	62.3	63.0	62.3
Mean	61.4	61.3	62.8	61.8
CV %	1.1	0.5	0.4	0.4
LSD 0.10	0.8	0.4	0.3	0.4

Table 19. Clearfield Lentil Seeds/lb, North Dakota, 2016.

Variety	Hettinger	Minot	Williston	3-location Average
		(seeds/lb)		
French Green				
CDC Peridot-CL	10,812	--	12,600	--
Green				
CDC Imigreen-CL	7,825	8,340	7,958	8,041
CDC Impress-CL	8,824	9,641	9,861	9,442
CDC Imvincible-CL	12,119	13,851	14,632	13,534
Red				
CDC Dazil-CL	12,103	--	14,175	--
CDC Impala-CL	12,971	15,084	17,446	15,167
CDC Proclaim-CL	10,677	--	11,937	--
CDC Maxim-CL	10,800	12,198	12,960	11,986
Mean	10,766	11,823	12,696	11,634
CV %	3.3	5.8	3.1	7.2
LSD 0.10	438	849	324	1,266

SAFFLOWER

Table 20. Safflower Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2016.

Location	Plant	Harvest	Previous Crop
Carrington	May 16	September 13	Barley
Hettinger	April 13	August 30	Chem fallow
Minot	May 17	September 14	Spring wheat
Williston	May 5	September 13	Durum

Table 21. Safflower Seed Yield, North Dakota, 2016.

Variety	Carrington no-till	Hettinger no-till	Minot min-till	Williston no-till	4-location Average
			(lb/acre)		
Oleic					
Hybrid 200	1,219	1,723	--	1,377	--
Hybrid 446	--	--	--	2,692	--
Hybrid 621	--	--	--	1,882	--
Hybrid 1601	1,899	2,095	3,213	2,558	2,441
Hybrid 9049	--	--	--	1,909	--
MonDak	1,320	1,559	2,269	2,251	1,850
Montola 2003	1,183	1,555	2,194	2,176	1,777
Linoleic					
Cardinal	1,210	1,805	2,228	2,585	1,957
Finch	1,070	1,669	2,378	1,736	1,713
NutraSaff	793	1,223	1,545	1,382	1,236
Mean	1,243	1,661	2,305	2,055	1,829
CV %	12.3	13.6	5.1	16.5	10.9
LSD 0.05	224	333	175	418	302
LSD 0.10	185	276	144	350	249

Table 22. Safflower Test Weight, North Dakota, 2016.

Variety	Carrington no-till	Hettinger no-till	Minot min-till	Williston no-till	4-location Average
			(lb/bu)		
Oleic					
Hybrid 200	34.7	40.5	--	42.9	--
Hybrid 446	--	--	--	45.4	--
Hybrid 621	--	--	--	38.6	--
Hybrid 1601	33.1	39.1	39.7	41.4	38.3
Hybrid 9049	--	--	--	43.9	--
MonDak	33.9	40.7	38.3	42.5	38.9
Montola 2003	32.4	39.5	40.8	41.8	38.6
Linoleic					
Cardinal	35.4	42.8	44.6	44.5	41.8
Finch	34.1	43.3	44.5	44.8	41.7
NutraSaff	30.7	34.8	36.9	38.9	35.3
Mean	33.3	40.0	40.8	42.4	39.1
CV %	3.6	1.8	3.1	1.6	2.8
LSD 0.05	1.8	1.0	1.8	0.9	1.7
LSD 0.10	1.5	0.9	1.5	0.8	1.4

Table 23. Safflower Seed Oil, North Dakota, 2016.

Variety	Hettinger no-till	Minot min-till	Carrington no-till	Williston no-till	4-location Average
			(%)		
Oleic					
Hybrid 200	35.0	--	28.9	30.0	--
Hybrid 446	--	--	--	30.7	--
Hybrid 621	--	--	--	38.2	--
Hybrid 1601	36.6	34.3	33.4	36.1	35.1
Hybrid 9049	--	--	--	30.5	--
MonDak	36.8	35.7	32.0	35.4	35.0
Montola 2003	38.6	35.5	33.2	37.5	36.2
Linoleic					
Cardinal	35.2	33.3	32.6	35.7	34.2
Finch	37.1	35.4	32.5	36.6	35.4
NutraSaff	45.1	42.7	41.5	47.8	44.3
Mean	37.8	36.2	33.4	35.9	36.7
CV %	1.9	2.4	3.5	2.5	2.5
LSD 0.05	1.0	1.9	1.7	1.3	1.4
LSD 0.10	0.9	1.6	1.4	1.1	1.1

CHICKPEA

Table 24. Chickpea trial planting and harvest dates, and previous crop, North Dakota, 2016.

Location	Planting Date	Harvest Date	Previous Crop
Hettinger	May 3	August 17	Winter Wheat
Minot	April 31	September 11	Spring Wheat
Williston-Dryland	May 6	August 18	Barley

Table 25. Chickpea Seed Yield, North Dakota, 2016.

Variety	Hettinger	Minot	Williston Dryland	2016 Average
	(lb/acre)			
Kabuli				
B-90	1,867	1,668	1,663	1,733
CDC Frontier	2,119	1,422	1,872	1,804
CDC Luna	2,054	1,014	1,564	1,544
CDC Orion	--	2,316	--	--
Sawyer	1,387	966	1,392	1,248
Sierra	879	--	895	--
Desi				
CDC Anna	2,136	1,014	1,545	1,565
Mean	1,740	1,400	1,489	1,579
CV %	12.7	45.2	13.5	13.3
LSD 0.10	268	1.1	246	318

Table 26. Chickpea Days to Flower, North Dakota, 2016.

Variety	Hettinger	Minot	Williston Dryland	2016 Average
	(days after planting)			
Kabuli				
B-90	48	58	52	53
CDC Frontier	48	56	51	52
CDC Luna	47	53	49	50
CDC Orion	--	52	--	--
Sawyer	48	56	51	52
Sierra	49	--	54	--
Desi				
CDC Anna	47	55	52	51
Mean	48	55	52	51
CV %	1.3	2.8	2.8	1.7
LSD 0.10	1	2	2	1

Table 27. Chickpea Test Weight, North Dakota, 2016.

Variety	Hettinger	Minot	Williston Dryland	2016 Average
	(lb/bu)			
Kabuli				
B-90	55.9	61.1	63.0	60.0
CDC Frontier	54.4	60.1	62.3	58.9
CDC Luna	53.4	60.2	61.7	58.4
CDC Orion	--	58.9	--	--
Sawyer	53.4	58.6	61.9	58.0
Sierra	52.5	--	61.1	--
Desi				
CDC Anna	53.7	59.2	62.9	58.6
Mean	53.9	59.7	62.2	58.8
CV %	1.2	2.0	1.0	1.0
LSD 0.10	0.8	1.1	0.7	0.9

FABA BEAN

Table 28. Faba Bean Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2016.

Location	Plant	Harvest	Previous Crop
Carrington	April 14	July 29	Spring Wheat
Langdon	May 3	September 20	Spring Wheat
Minot	May 6	August 31	Spring Wheat
Nesson Valley (Williston REC; irrigated)	May 6	August 29	Barley

Table 29. Faba Bean Seed Yield, North Dakota, 2016.

Variety	Langdon	Minot	Nesson Valley	3-location average
	(lb/acre)			
Boxer	6,052	6,100	5,679	5,944
Fabelle	4,921	4,462	5,534	4,972
FanFare	5,626	5,537	4,794	5,319
Laura	5,061	6,084	5,868	5,671
Snowdrop	4,170	4,415	--	--
Tobasco	4,901	5,330	4,661	4,964
Vertigo	5,952	5,887	--	--
Mean	5,240	5,402	5,307	5,374
CV %	8.1	3.4	15.8	9
LSD 0.05	556	324	1289	890
LSD 0.10	462	265	1054	718

Table 30. Faba Bean Days to Flower, North Dakota, 2016.

	Days to Flower				
Variety	Carrington	Langdon	Minot	Nesson Valley	4-location average
	(days after planting)				
Boxer	54	50	43	54	50
Fabelle	56	51	44	54	51
FanFare	54	50	45	53	51
Laura	54	50	44	54	51
Snowdrop	58	52	45	--	--
Tobasco	57	51	44	54	52
Vertigo	55	50	42	--	--
Mean	55	51	44	54	51
CV %	1.2	0.9	4.0	1.7	1.5
LSD 0.05	1.0	0.7	NS	1.4	1.2
LSD 0.10	0.8	0.5	NS	1.1	1.0

Table 31. Faba Bean Test Weight, North Dakota, 2016.

Variety	Carrington	Langdon	Minot	Nesson Valley	4-location average
	(lb/bu)				
Boxer	60.1	63.2	60.9	64.3	62.1
Fabelle	60.5	62.3	61.9	64.3	62.3
FanFare	60.7	63.6	61.1	64.8	62.6
Laura	60.1	63.1	60.3	64.2	61.9
Snowdrop	60.0	62.9	60.6	--	--
Tobasco	59.7	63.0	61.8	64.7	62.3
Vertigo	60.7	63.9	61.8	--	--
Mean	60.3	63.1	61.2	64.0	62.2
CV %	0.8	0.6	0.7	0.5	0.8
LSD 0.05	0.7	0.5	0.8	0.5	NS
LSD 0.10	0.6	0.4	0.6	0.4	0.6

Table 32. Faba Bean Seed Protein, North Dakota, 2016.

Variety	Langdon	Minot	2-location average
	(%)		
Boxer	23.9	21.8	22.9
Fabelle	25.2	24.1	24.7
FanFare	23.5	23.2	23.4
Laura	23.8	21.7	22.8
Snowdrop	21.9	21.5	21.7
Tobasco	21.6	22.5	22.1
Vertigo	23.4	23.0	23.2
Mean	23.3	22.5	22.9
CV %	1.8	4.0	2.3
LSD 0.05	0.6	1.7	1.0
LSD 0.10	0.5	1.4	0.8

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