

North Dakota Alternative Crop Variety Trial Results for 2015 and Selection Guide

Compiled by

Gregory Endres

Extension Area Agronomist,
Carrington Research Extension Center

Hans Kandel

Extension Agronomist, Fargo

Shana Forster

Extension Area Agronomist,
North Central Research Extension Center

Diana Amiot

Research Specialist/Agronomy,
Williston Research Extension Center

This publication contains information on selected varieties of **flax, lentil, safflower, chickpea, buckwheat and faba bean** that North Dakota State University tested in 2015. **Table 1** lists crop acreage during the past six 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.

Table 1. Crop acres¹, North Dakota, 2009-15.

Crop	2015	2014	2013	2012	2011	2010	2009	7-year average
Flax	403,210	260,150	146,770	303,450	148,200	381,510	286,060	275,620
Lentil	162,990	72,950	126,050	152,150	74,710	260,260	161,930	144,430
Safflower	10,170	13,290	14,930	14,170	2,380	15,230	19,280	12,780
Chickpea	7,000	6,180	9,400	11,040	3,980	15,630	19,830	10,440
Buckwheat	13,930	14,220	12,170	26,550	22,580	20,230	15,170	17,840
Faba bean	720	1,320	—	—	—	—	—	—

¹ Farm Service Agency reported acreage.

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 is used to indicate 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.

Information contained in this publication is based on research conducted by the following NDSU Research Extension Center and Main Station research agronomy staff:

Mike Ostlie, Blaine Schatz, Jesper Nielsen, Steve Schaubert and Steve Zwinger - Carrington

Glenn Martin – Dickinson

James Hammond, Kevin McPhee, Burton Johnson, Paula Petersen and Sydney Gilles – Fargo

John Rickertsen and Rick Olson – Hettinger

Bryan Hanson, Travis Hakanson and Lawrence Henry – Langdon

Erik Eriksmoen, Thomas Stefaniak, James Tarasenko and Joe Effertz – Minot (North Central)

Jerry Bergman, Gautam Pradhan, Diana Amiot, Tyler Tjelde, Austin Link, Justin Jacobs and Cameron Wahlstrom – Williston

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 an electronic format at www.ag.ndsu.edu/varietytrials.

Weather data are available at <http://ndawn.ndsu.nodak.edu/>.

TABLE *of* CONTENTS

Crop	Pages	Tables
Flax	3-4	2-4
Lentil	5-12	5-17
Safflower	13-14	18-22
Chickpea	15-16	23-26
Buckwheat	16-17	27-30
Faba bean	18-19	31-36

Table 2. Flax Trial Planting and Harvest Dates, North Dakota 2015.

Location	Plant	Harvest
Carrington	May 5	Aug. 31
Hettinger	April 30	Aug. 12
Langdon	May 29	Sept. 21
Williston - dryland	April 30	Sept. 16
Williston - irrigated	May 1	Aug. 20

Table 3. Flax Seed Yield, North Dakota, 2013-2015.

Variety	Carrington		Langdon		Williston		Williston-irrigated	Hettinger		Average N.D. ¹	
	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.	2015	2015	3 Yr.	2015	3 Yr.
	(bu/acre)										
Carter ¹	30.0	24.9	36.4	38.0	30.1	25.0	32.6	35.5	26.5	33.0	29.3
CDC Arras	21.9	20.9	36.5	38.8	26.0	24.0	--	31.4	26.0	29.0	27.9
Bethune	29.9	25.3	37.5	38.4	27.8	23.5	36.1	32.5	27.8	31.9	29.1
CDC Glas	35.0	--	41.3	41.9	30.4	24.9	48.7	35.4	--	35.5	--
CDC Neela	32.5	--	39.4	--	31.5	-	--	36.2	--	34.9	--
Sanctuary	32.9	25.8	41.2	40.6	28.1	24.3	37.4	35.1	--	34.3	30.2
CDC Sorrel	33.2	28.6	40.1	38.6	29.5	27.0	--	32.8	--	33.9	31.4
Gold ND ¹	36.5	26.8	36.3	37.9	29.8	25.6	--	33.1	--	33.9	30.1
Hanley	30.9	24.2	37.1	38.3	27.7	23.7	38.4	32.1	26.1	31.9	28.7
Lightning	26.2	22.8	35.2	37.6	25.9	23.9	--	33.0	25.9	30.1	28.1
Nече	27.6	24.6	36.8	38.2	25.4	24.6	34.4	29.7	--	29.9	29.1
Nekoma	33.5	27.2	37.4	37.7	27.2	23.9	--	32.8	27.5	32.7	29.6
Omega ¹	23.5	20.5	35.8	36.9	27.4	23.4	--	27.2	--	28.5	26.9
Pembina	25.7	23.8	36.9	37.6	27.7	22.8	--	30.5	26.8	30.2	28.1
Prairie Blue	26.3	20.3	37.5	37.1	28.6	25.7	39.8	33.8	28.7	31.5	27.7
Grande	30.5	24.6	37.2	34.2	27.1	22.9	--	33.2	27.6	32.0	27.2
Sapphire	32.3	24.5	38.3	41.1	26.9	22.7	--	30.5	--	32.0	29.4
Thunder	27.9	23.1	37.3	41.3	27.4	23.0	--	28.2	26.6	30.2	29.1
Rahab 94	29.8	26.0	37.8	36.6	27.6	24.5	--	33.1	--	32.1	29.0
Shape	28.8	23.7	40.1	41.1	26.2	22.0	--	31.4	--	31.6	28.9
Webster	27.6	25.2	35.0	39.5	27.5	22.8	41.4	30.8	26.0	30.2	29.2
York	30.2	26.4	35.4	37.4	26.6	24.1	--	33.8	29.2	31.5	29.3
Mean	29.7	24.5	37.6	38.5	27.7	24.0	38.6	32.4	26.6	31.9	28.9
CV %	12.8	--	5.7	--	9.2	-	12.9	6.9	--	5.8	5.9
LSD 0.05	5.4	--	3.0	--	3.5	-	2.4	3.2	--	2.6	2.8
LSD 0.10	4.5	--	2.5	--	3.0	-	2.0	2.6	--	2.2	2.4

¹Yellow seeded.²Average 2015 of the four dryland trials and 3 Yr. is from Carrington, Langdon and Williston.

Table 4. Flax Test Weight and Oil, North Dakota, 2013-2015.

Variety	Carrington		Langdon	Williston		Williston-irr.		Hettinger		Average N.D. ¹	
	Test Wt.	Oil	Test Wt.	Test Wt.	Oil	Test Wt.	Oil	Test Wt.	Oil	Test Wt.	Oil
	(lb/bu)	(%)	(lb/bu)	(lb/bu)	(%)	(lb/bu)	(%)	(lb/bu)	(%)	(lb/bu)	(%)
Carter ²	53.7	44.0	53.0	54.2	37.8	54.1	36.8	56.4	45.5	54.3	42.4
CDC Arras	52.4	43.1	51.9	53.6	37.6	--	--	56.0	44.7	53.5	41.8
Bethune	52.6	45.6	51.9	53.9	37.7	54.1	37.6	56.2	44.9	53.6	42.7
CDC Glas	52.7	46.2	50.8	52.7	38.7	53.2	38.5	54.9	46.5	52.8	43.8
CDC Neela	53.6	44.9	51.9	53.2	38.6	--	--	55.5	46.3	53.6	43.3
Sanctuary	53.1	44.9	50.7	53.3	38.4	53.2	37.5	54.9	45.9	53.0	43.1
CDC Sorrel	52.9	45.3	52.3	53.5	38.8	--	--	55.5	45.3	53.5	43.1
Gold ND ¹	53.8	44.2	52.3	54.2	38.9	--	--	56.2	46.7	54.1	43.2
Hanley	52.1	46.9	52.2	53.7	37.8	53.8	37.3	55.7	44.9	53.4	43.2
Lightning	52.4	42.2	52.1	53.5	38.1	--	--	56.0	45.1	53.5	41.8
Neché	52.7	44.0	52.5	53.9	37.4	53.8	37.1	55.9	45.1	53.7	42.1
Nekoma	53.6	45.5	52.6	54.2	38.2	--	--	55.7	45.6	54.0	43.1
Omega ¹	53.4	44.5	53.1	54.5	37.5	--	--	56.7	46.1	54.4	42.7
Pembina	51.7	44.1	52.8	53.7	38.4	--	--	55.5	45.9	53.4	42.8
Prairie Blue	52.2	45.6	51.7	53.7	38.6	53.4	38.2	55.6	46.4	53.3	43.6
Grande	52.6	46.0	51.0	53.7	38.2	--	--	55.4	46.5	53.2	43.6
Sapphire	51.9	46.2	51.4	52.6	39.3	--	--	54.5	46.7	52.6	44.0
Thunder	53.2	44.9	51.5	53.9	37.2	--	--	56.2	43.8	53.7	42.0
Rahab 94	53.5	45.1	50.2	52.8	38.1	--	--	55.1	46.0	52.9	43.1
Shape	52.9	44.5	51.4	53.3	39.3	--	--	55.2	46.7	53.2	43.5
Webster	53.8	43.8	52.2	53.8	38.4	54.0	38.1	55.9	45.5	53.9	42.6
York	52.6	43.6	52.4	53.7	37.5	--	--	55.5	45.5	53.6	42.2
Mean	52.9	44.8	51.9	53.6	38.2	53.7	37.6	55.7	45.7	53.5	42.9
CV %	0.9	2.6	51.9	0.5	1.1	0.6	0.9	0.6	1.3	0.8	1.6
LSD 0.05	0.6	1.6	1.0	0.4	0.6	0.2	0.2	0.4	0.8	0.6	1.1
LSD 0.10	0.5	1.4	0.7	0.3	0.5	0.2	0.2	0.4	0.7	0.5	1.0

¹Test weight average of the four dryland trials and oil average of the three dryland trials.

²Yellow seeded.

Table 5. Lentil Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Planting	Harvest	Previous Crop
Carrington	April 22	Aug. 10	Durum wheat
Dickinson	April 24	Aug. 24	Spring wheat
Golden Valley	May 5	Sept. 2	Durum wheat
Hettinger	April 15	Aug. 5	Field pea
Nesson Valley-irrigated	May 4	Aug. 10	Barley
Williston	April 29	Aug. 18	Spring wheat

Table 6. Lentil Yield Across Locations, North Dakota, 2015.

Variety	Seed Coat Color	Market Type	Average Yield Across Locations (% of CDC Richlea)	
			2015	2 Year ¹
Avondale	Green	Medium	104	108
CDC Greenland	Green	Large	86	89
CDC LeMay	French Green	Small	85	90
CDC Red Rider	Red	Medium	98	101
CDC Redberry	Red	Small	99	101
CDC Redcoat	Red	Small	94	105
CDC Richlea	Green	Medium	100	100
CDC Rosetown	Red	Extra small	91	100
CDC Rouleau	Red	Small	95	109
CDC Viceroy	Green	Small	103	105
Crimson	Red	Small	81	--
Essex	Green	Small	85	84
Eston	Green	Small	100	100
Merrit	Green	Medium	79	--
Morena	Pardina	Small	77	84
Pardina	Pardina	Small	100	--
Pennell	Green	Large	77	88
Riveland	Green	Large	81	86

¹ Based on 2014 and 2015 percentage.

Table 7. Lentil Seed Yield, North Dakota, 2015.

Variety	Carrington	Dickinson	Golden Valley	Hettinger	Nesson Valley	Williston	2015 Average
(lb/acre)							
French Green							
CDC LeMay	1,576	1,949	1,275	3,005	--	1,561	--
Green							
Avondale	2,053	--	2,434	2,844	2,380	1,730	--
CDC Greenland	1,908	2,155	1,657	2,823	1,529	1,305	1,896
CDC Richlea	1,564	2,337	2,773	2,804	1,947	1,798	2,204
CDC Viceroy	1,692	2,544	2,232	2,951	2,616	1,533	2,261
Essex	1,204	--	2,279	2,388	1,708	1,757	--
Eston	2,070	--	--	2,823	--	1,745	--
Merrit	1,703	--	1,670	2,407	--	1,219	--
Pennell	1,224	1,583	2,026	2,527	1,269	1,595	1,704
Riveland	1,776	1,659	--	2,374	--	1,367	--
Pardina							
Morena	766	--	--	2,786	--	1,536	--
Pardina	1,610	--	--	3,266	--	1,759	--
Red							
CDC Redberry	2,113	1,811	1,619	3,295	2,805	1,501	2,191
CDC Redcoat	1,536	--	--	3,057	--	1,620	--
CDC Red Rider	1,570	2,551	2,244	2,974	2,013	1,631	2,164
CDC Rosetown	1,630	2,124	--	2,768	--	1,478	--
CDC Rouleau	1,410	2,241	--	3,154	--	1,563	--
Crimson	1,299	--	--	2,534	--	1,538	--
Mean	1,628	2,095	2,021	2,687	2,033	1,533	2,000
CV %	22.5	12.3	13.3	7.0	18.1	10.0	--
LSD 0.10	514	310	382	221	448	180	--

Table 8. Lentil Days to 10 Percent Flowering, North Dakota, 2015.

Variety	Carrington	Dickinson	Hettinger	Nesson Valley	Williston	2015 Average
(days after planting)						
French Green						
CDC LeMay	59	61	69	--	59	--
Green						
Avondale	54	--	68	53	59	--
CDC Greenland	56	61	69	54	62	60
CDC Richlea	56	61	69	54	59	60
CDC Viceroy	58	61	69	53	59	60
Essex	58	--	68	54	60	--
Eston	53	--	69	--	60	--
Merrit	53	--	68	--	62	--
Pennell	55	61	69	54	58	59
Riveland	54	60	68	--	62	--
Pardina						
Morena	54	--	69	--	61	--
Pardina	54	--	69	--	60	--
Red						
CDC Redberry	57	61	68	53	60	60
CDC Redcoat	59	--	69	--	58	--
CDC Red Rider	56	61	69	53	62	60
CDC Rosetown	57	61	69	--	61	--
CDC Rouleau	56	61	69	--	61	--
Crimson	59	--	68	--	58	--
Mean	55	61	68	53	60	59
CV %	1.8	0.8	0.5	2.2	2.9	--
LSD 0.10	1	1	0	1	2	--

Table 9. Lentil Canopy Height, North Dakota, 2015.

Variety	Carrington	Dickinson	Hettinger	Nesson Valley	Williston	2015 Average
(inches)						
<i>French Green</i>						
CDC LeMay	13	13	12	--	11	--
<i>Green</i>						
Avondale	14	--	12	12	12	--
CDC Greenland	14	16	10	12	12	13
CDC Richlea	15	15	11	12	13	13
CDC Viceroy	14	15	11	12	12	13
Essex	14	--	14	12	11	--
Eston	14	--	11	--	11	--
Merrit	13	--	10	--	10	--
Pennell	14	14	12	12	12	13
Riveland	15	13	12	--	14	--
<i>Pardina</i>						
Morena	14	--	10	--	12	--
Pardina	13	--	11	--	9	--
<i>Red</i>						
CDC Redberry	14	14	11	12	10	12
CDC Redcoat	14	--	12	--	10	--
CDC Red Rider	14	--	12	12	11	--
CDC Rosetown	14	15	12	--	11	--
CDC Rouleau	14	15	12	--	13	--
Crimson	13	--	10	--	10	--
Mean	14	15	11	12	11	13
CV %	6.9	8.4	10.7	10.1	9.7	--
LSD 0.10	1	1	1	1	1	--

Table 10. Lentil Test Weight, North Dakota, 2015.						
Variety	Carrington	Dickinson	Golden Valley	Hettinger	Williston	2015 Average
(lb/bu)						
<i>French Green</i>						
CDC LeMay	62.5	62.7	59.9	62.7	60.5	61.7
<i>Green</i>						
Avondale	60.4	--	58.8	60.9	58.5	--
CDC Greenland	58.3	60.0	54.6	60.2	56.8	58.0
CDC Richlea	59.3	63.1	58.6	59.9	58.9	60.0
CDC Viceroy	62.1	63.3	60.0	62.4	60.3	61.6
Essex	60.6	--	59.6	59.2	59.1	--
Eston	59.5	--	--	62.8	60.1	--
Merrit	57.1	--	55.7	58.5	56.1	--
Pennell	57.8	59.3	57.2	59.7	57.2	58.2
Riveland	58.2	61.2	--	58.1	55.7	--
<i>Pardina</i>						
Morena	60.6	--	--	62	60.5	--
Pardina	62.0	--	--	61.3	60.9	--
<i>Red</i>						
CDC Redberry	61.8	62.2	59.1	62.0	59.1	60.8
CDC Redcoat	61.3	--	--	62.1	60.4	--
CDC Red Rider	61.0	62.5	59.8	61.0	59.7	60.8
CDC Rosetown	63.5	63.7	--	62.8	60.4	--
CDC Rouleau	60.3	60.8	--	61.3	59.4	--
Crimson	61.8	--	--	63.0	60.2	--
Mean	60.2	61.9	58.3	60.5	59.0	60.0
CV %	1.1	2.3	0.5	4.4	0.4	--
LSD 0.10	0.9	1.7	0.5	0.9	0.3	--

Table 11. Lentil Seeds/lb, North Dakota, 2015.				
Variety	Carrington	Dickinson	Hettinger	2015 Average
(seeds/lb)				
French Green				
CDC LeMay	15,862	14,006	14,035	14,634
Green				
Avondale	10,858	--	10,318	--
CDC Greenland	8,336	7,013	9,003	8,117
CDC Richlea	11,888	8,639	10,452	10,326
CDC Viceroy	16,546	13,168	14,553	14,756
Essex	12,947	--	11,128	--
Eston	15,632	--	14,366	--
Merrit	8,887	--	7,797	--
Pennell	9,315	6,455	8,965	8,245
Riveland	7,443	7,096	8,019	7,519
Pardina				
Morena	14,266	--	11,898	--
Pardina	13,717	--	12,714	--
Red				
CDC Redberry	13,118	10,673	11,641	11,811
CDC Redcoat	14,409	--	11,938	--
CDC Red Rider	12,454	9,716	10,817	10,996
CDC Rosetown	17,587	15,760	16,936	16,761
CDC Rouleau	15,358	11,971	12,988	13,439
Crimson	14,695	--	13,358	14,027
Mean	12,219	10,450	11,081	11,250
CV %	5.5	6.6	4.4	--
LSD 0.10	1,262	828	574	--

Table 12. Clearfield Lentil Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Planting Date	Harvest Date	Previous crop
Carrington	April 22	Aug. 10	Durum
Dickinson	April 24	Aug. 24	Spring wheat
Golden Valley	May 5	Sept. 2	Durum
Hettinger	April 22	Aug. 10	Field pea
Minot	May 10	Aug. 31	Spring wheat

Table 13. Clearfield Lentil Seed Yield, North Dakota, 2015.

Variety	Carrington	Dickinson	Golden		Minot	2015
			Valley	Hettinger		Average
(lb/acre)						
Green						
CDC Imigreen-CL	1,766	1,940	1,530	3,012	1,692	1,988
CDC Imvincible-CL	1,730	2,754	2,532	3,624	2,106	2,549
Red						
CDC Impala-CL	1,801	2,762	2,875	3,428	2,004	2,574
CDC Maxim-CL	1,997	2,682	2,694	4,007	2,010	2,678
Mean	1,823	2,534	2,408	3,518	1,980	2,453
CV %	25.9	4.3	11.6	7.6	18.6	--
LSD 0.10	NS	140	363	347	534	--

Table 14. Clearfield Lentil Days to 10 Percent Flowering, North Dakota, 2015.

Variety	Carrington	Dickinson	Hettinger	Average
				(days after planting)
Green				
CDC Imigreen-CL	59	61	63	61
CDC Imvincible-CL	56	60	63	60
Red				
CDC Impala-CL	57	60	65	61
CDC Maxim-CL	55	60	62	59
Mean	57	60	63	60
CV %	1.4	0.8	0.7	--
LSD 0.10	1	NS	1	--

Table 15. Clearfield Lentil Canopy Height, North Dakota, 2015.				
Variety	Carrington	Dickinson	Hettinger	Average
	(inches)			
Green				
CDC Imigreen-CL	16	15	14	15
CDC Invincible-CL	16	14	13	14
Red				
CDC Impala-CL	15	14	14	14
CDC Maxim-CL	16	15	13	15
Mean	16	15	13	15
CV %	6.6	8.8	12.1	--
LSD 0.10	NS	NS	2	

Table 16. Clearfield Lentil Test Weight, North Dakota, 2015.						
Variety	Carrington	Dickinson	Golden Valley	Hettinger	Minot	Average
	(lb/bu)					
Green						
CDC Imigreen-CL	61.7	60.8	57.3	62.4	60.3	60.5
CDC Invincible-CL	62.6	62.7	60.1	63.2	61.5	62.0
Red						
CDC Impala-CL	63.1	63.2	60.8	63.9	61.6	62.5
CDC Maxim-CL	61.9	62.3	60.3	63.4	60.3	61.6
Mean	62.3	62.2	59.6	63.2	61.0	61.7
CV %	1.5	1.5	0.5	0.7	2.1	--
LSD 0.10	NS	1.2	0.4	0.6	1.0	--

Table 17. Clearfield Lentil Seeds/lb, North Dakota, 2015.					
Variety	Carrington	Dickinson	Hettinger	Minot	Average
	(seeds/lb)				
Green					
CDC Imigreen-CL	11,862	7,693	9,029	10,923	9,877
CDC Invincible-CL	13,800	13,131	14,573	13,248	13,688
Red					
CDC Impala-CL	15,611	14,891	15,572	13,685	14,940
CDC Maxim-CL	12,339	11,146	12,714	12,036	12,059
Mean	13,403	11,715	12,972	12,473	12,641
CV %	23.1	1.9	5.6	9.2	--
LSD 0.10	NS	284	950	681	--

Table 18. Safflower Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Plant	Harvest	Previous Crop
Carrington	May 28	Sept. 28	Spring wheat
Hettinger	April 22	Sept. 24	Spring wheat
Minot	May 11	Sept. 12	Soybean
Prosper	May 22	Sept. 11	Spring wheat
Williston	May 5	Sept. 14	Spring wheat

Table 19. Safflower Seed Yield, North Dakota, 2015.

Variety	Carrington	Hettinger	Minot	Prosper	Williston	5-location Average
	no-till	no-till	no-till	conventional	no-till	
(lb/acre)						
Oleic						
Hybrid 200	1,844	3,412	2,594	2,641	2,170	2,532
Hybrid 446	1,627	3,302	2,145	2,375	2,461	2,382
Hybrid 621	1,050	2,860	1,853	1,749	1,710	1,844
Hybrid 1601	2,253	3,750	2,969	2,559	2,742	2,855
Hybrid 9049	1,629	3,082	2,226	2,261	1,784	2,196
MonDak	1,800	3,050	2,074	2,310	2,183	2,283
Montola 2003	1,573	3,346	2,685	2,494	1,963	2,412
Linoleic						
Cardinal	1,258	2,497	2,185	2,021	1,895	1,971
Finch	1,199	2,672	2,085	1,858	1,552	1,873
NutraSaff	662	2,162	1,834	1,633	1,520	1,562
Mean	1,490	3,013	2,265	2,190	1,998	2,191
CV %	12.8	7.7	6.7	8.7	9.0	--
LSD 0.05	277	337	220	276	343	--
LSD 0.10	230	279	183	--	285	--

Table 20. Safflower Plant Height, North Dakota, 2015.

Variety	Carrington	Hettinger	Minot	Prosper	Williston	5-location Average
	no-till	no-till	no-till	conventional	no-till	
(inches)						
Oleic						
Hybrid 200	25	34	26	39	25	30
Hybrid 446	25	32	24	38	25	29
Hybrid 621	28	36	27	41	23	31
Hybrid 1601	26	36	27	41	25	31
Hybrid 9049	25	36	26	39	22	30
MonDak	25	35	26	38	22	29
Montola 2003	24	32	24	35	22	27
Linoleic						
Cardinal	28	39	28	40	23	32
Finch	26	35	26	38	22	29
NutraSaff	26	36	27	39	23	30
Mean	26	35	26	39	23	30
CV %	3.8	3.6	4.4	3.5	4.7	--
LSD 0.05	1.4	1.9	2.0	2.0	2.2	--
LSD 0.10	1.2	1.5	1.0	--	1.8	--

Table 21. Safflower Test Weight, North Dakota, 2015.

Variety	Carrington	Hettinger	Minot	Prosper	Williston	5-location Average
	no-till	no-till	no-till	conventional	no-till	
(lb/bu)						
Oleic						
Hybrid 200	38.9	41.4	41.1	33.3	43.9	39.7
Hybrid 446	39.3	41.1	39.6	33.2	43.5	39.3
Hybrid 621	35.3	34.7	34.9	29.2	38.3	34.5
Hybrid 1601	38.2	38.7	37.6	31.8	40.4	37.3
Hybrid 9049	38.7	40.7	39.4	32.6	42.7	38.8
MonDak	38.9	41.0	39.9	31.0	43.1	38.8
Montola 2003	38.4	39.9	38.7	31.5	42.1	38.1
Linoleic						
Cardinal	39.5	41.1	40.2	33.2	44.1	39.6
Finch	39.3	43.3	40.3	32.3	43.7	39.8
NutraSaff	34.3	34.0	35.5	29.2	39.7	34.5
Mean	38.1	39.6	38.7	31.7	42.2	38.1
CV %	2.2	1.9	2.5	5.4	1.2	--
LSD 0.05	1.2	1.1	1.4	2.5	1.0	--
LSD 0.10	1.0	0.9	1.2	--	0.9	--

Table 22. Safflower Seed Oil, North Dakota, 2015.

Variety	Hettinger	Minot	Prosper	Williston	4-location Average
	no-till	no-till	conventional	no-till	
(%)					
Oleic					
Hybrid 200	31.1	33.3	29.4	33.3	31.8
Hybrid 446	31.3	32.9	30.3	33.6	32.0
Hybrid 621	37.6	40.5	39.1	40.3	39.4
Hybrid 1601	34.7	37.0	35.5	37.1	36.1
Hybrid 9049	29.9	31.6	27.9	32.1	30.4
MonDak	34.8	35.8	31.4	36.5	34.6
Montola 2003	36.7	38.1	32.2	38.1	36.3
Linoleic					
Cardinal	32.3	33.3	31.4	37.3	33.6
Finch	33.6	34.4	32.1	37.2	34.3
NutraSaff	41.8	43.5	42.8	47.6	43.9
Mean	34.4	36.0	33.2	37.3	35.2
CV %	2.5	1.3	3.8	1.2	--
LSD 0.05	0.8	0.6	1.8	0.9	--
LSD 0.10	0.6	0.4	--	0.8	--

Table 23. Chickpea Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Planting Date	Harvest Date	Previous Crop
Dickinson	April 24	Sept. 2	Spring wheat
Hettinger	April 15	Aug. 26	Winter wheat
Williston-dryland	May 1	Sept. 15	Spring wheat

Table 24. Chickpea Seed Yield, North Dakota, 2015.

Variety	Dickinson	Hettinger	Williston	2015 Average
			Dryland	
(lb/acre)				
Kabuli				
B-90	--	4,345	1,739	--
CDC Alma	--	4,646	2,243	--
CDC Frontier	2,305	4,952	2,094	3,117
CDC Luna	2,009	4,787	1,879	2,892
CDC Orion	2,183	5,091	1,951	3,075
Sawyer	1,827	3,954	1,758	2,513
Sierra	1,570	3,845	1,527	2,314
Desi				
CDC Anna	2,119	4,299	2,113	2,844
Mean	2,002	3,858	1,801	2,554
CV %	7.9	8.2	10.1	--
LSD 0.10	196	374	215	--

Table 25. Chickpea Days to 10 Percent Flowering, North Dakota, 2015.

Variety	Dickinson	Hettinger	Williston	2015 Average
			Dryland	
(days after planting)				
Kabuli				
B-90	--	71	59	--
CDC Alma	--	70	55	--
CDC Frontier	65	71	55	64
CDC Luna	62	70	54	62
CDC Orion	62	69	53	61
Sawyer	62	70	54	62
Sierra	62	70	55	62
Desi				
CDC Anna	64	70	53	62
Mean	63	70	54	62
CV %	0.5	0.6	2.6	--
LSD 0.10	0	1	2	--

Table 26. Chickpea Test Weight, North Dakota, 2015.

Variety	Dickinson	Hettinger	Williston Dryland	2015 Average
(lb/bu)				
<i>Kabuli</i>				
B-90	--	50.9	62.1	--
CDC Alma	--	51.4	62.6	--
CDC Frontier	60.9	53.7	62.0	58.9
CDC Luna	60.5	53.0	61.3	58.3
CDC Orion	59.6	53.2	60.1	57.6
Sawyer	60.4	55.7	62.1	59.4
Sierra	59.8	52.2	60.5	57.5
<i>Desi</i>				
CDC Anna	60.0	49.4	61.0	56.8
Mean	60.2	51.9	60.9	57.7
CV %	0.5	3.0	0.9	--
LSD 0.10	0.4	1.8	0.7	--

Table 27. Buckwheat Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Plant	Harvest	Previous Crop
Carrington	June 3	Sept. 3	Spring wheat
Langdon	May 29	Sept. 28	Soybean
Minot	June 9	Sept. 30	Flax

Table 28. Buckwheat Seed Yield, North Dakota, 2015.

Variety	Carrington	Langdon	Minot	3-location average
(lb/acre)				
AC Springfield	411	828	1,963	1,067
Horizon	435	836	1,856	1,042
Koma	382	855	1,780	1,006
Koto	586	757	1,824	1,056
Manor	417	796	2,032	1,082
Mean	446	814	1,891	1,051
CV %	23.8	10.2	7.5	8.6
LSD 0.05	164	NS	218	NS
LSD 0.10	137	NS	179	NS

Table 29. Buckwheat Days to Flower and Plant Lodge, North Dakota, 2015.

Variety	Days to Flower		Plant Lodge ¹	
	Carrington	Langdon	Carrington	Langdon
	(days after planting)		(0-9)	
AC Springfield	31	35	3	1
Horizon	34	37	2	1
Koma	34	37	3	3
Koto	31	35	1	1
Manor	32	36	5	2
Mean	32	36	3	2
CV %	1.5	1.8	18.7	63.9
LSD 0.05	1	1	1	1
LSD 0.10	1	1	1	1

¹Plant lodge: 0=no lodging;9=plants lying flat.

Table 30. Buckwheat Test Weight, North Dakota, 2015.

Variety	Carrington	Langdon	Minot	3-location average
	(lb/bu)			
AC Springfield	45.6	37.5	37.7	40.3
Horizon	46.7	37.4	38.3	40.8
Koma	49.0	38.4	41.4	42.9
Koto	47.9	38.6	38.9	41.8
Manor	46.7	37.7	38.9	41.1
Mean	47.3	37.9	39.1	41.4
CV %	1.3	3.7	1.6	1.5
LSD 0.05	2.4	NS	0.9	1.8
LSD 0.10	2.0	NS	0.8	1.5

Table 31. Faba Bean Trial Planting and Harvest Dates, and Previous Crop, North Dakota, 2015.

Location	Plant	Harvest	Previous Crop
Carrington	April 22	Aug. 17	Durum wheat
Langdon	May 5	Sept. 30	Spring wheat
Minot	May 1	Sept. 2	Spring wheat

Table 32. Faba Bean Seed Yield, North Dakota, 2015.

Variety	Carrington	Langdon	Minot	3-location
				average
(lb/acre)				
Boxer	4,854	5,304	4,837	4,998
MNA69360	4,434	5,116	4,796	4,782
MNA71230	4,800	5,601	5,045	5,149
Merlin	3,918	4,178	3,606	3,901
Mistral	3,786	4,007	3,920	3,904
Tobasco	4,038	4,188	3,952	4,059
Mean	4,314	4,732	4,359	4,466
CV %	7.8	7.4	6.0	3.5
LSD 0.05	480	524	395	205
LSD 0.10	402	431	325	169

Table 33. Faba Bean Days to Flower, North Dakota, 2015.

Variety	Days to Flower		
	Carrington	Langdon	2-location
			average
(days after planting)			
Boxer	54	53	54
MNA69360	53	52	53
MNA71230	54	53	54
Merlin	55	54	55
Mistral	55	54	55
Tobasco	55	54	55
Mean	55	53	54
CV %	1.4	0.9	--
LSD 0.05	1	1	--
LSD 0.10	1	1	--

Table 34. Faba Bean Test Weight, North Dakota, 2015.

Variety	Carrington	Langdon	Minot	3-location
				average
(lb/bu)				
Boxer	63.5	63.5	58.8	61.9
MNA69360	63.6	63.2	58.5	61.8
MNA71230	64.6	64.4	59.5	62.8
Merlin	64.0	63.3	59.5	62.3
Mistral	63.7	64.2	59.6	62.5
Tobasco	63.3	62.8	58.6	61.6
Mean	63.7	63.6	59.1	62.1
CV %	0.8	0.7	0.6	0.5
LSD 0.05	0.7	0.7	0.5	0.5
LSD 0.10	0.6	0.6	0.4	0.5

Table 35. Faba Bean Seed Weight, North Dakota, 2015.

Variety	Carrington	Langdon	Minot	3-location
				average
(1,000 kernel weight - grams)				
Boxer	498	583	499	527
MNA69360	542	572	531	548
MNA71230	522	609	504	545
Merlin	546	610	528	561
Mistral	546	583	541	557
Tobasco	386	440	410	412
Mean	490	566	502	525
CV %	5.4	--	5.9	3.2
LSD 0.05	37	--	44	31
LSD 0.10	31.0	--	36.0	25

Table 36. Faba Bean Seed Protein, North Dakota, 2015.

Variety	Carrington	Minot	2-location
			average
(%)			
Boxer	19.7	25.1	22.4
MNA69360	19.4	25.4	22.4
MNA71230	19.2	26.8	23.0
Merlin	21.8	25.6	23.7
Mistral	21.5	26.4	24.0
Tobasco	21.5	26.2	23.9
Mean	20.2	25.9	23.2
CV %	2.2	--	--
LSD 0.05	0.6	--	--
LSD 0.10	0.5	--	--

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