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2021 DRY BEAN Grower Survey

of Production, Pest Problems and Pesticide Use

in Minnesota and North Dakota

J.J. Knodel, P.B. Beauzay, M. Ebert, G.J. Endres, D.W. Franzen, J.T. Ikley, H.J. Kandel, S.G. Markell, and J.M. Osorno

In cooperation with the Northarvest Bean Growers Association

NDSU | EXTENSION

North Dakota State University, Fargo, ND 58108

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Introduction

The 2021 dry bean grower survey is the 32nd annual survey of varieties grown, pest problems, pesticide use and grower practices of the Northarvest Bean Growers Association, an association of dry edible bean growers in Minnesota and North Dakota. Research and Extension faculty at North Dakota State University (NDSU) and the directors of the Northarvest Bean Growers Association developed the survey form (Appendix I). The survey was mailed to all Northarvest bean growers. All participants in the survey were anonymous.

Results of previous surveys dated 1987-1992, 1994-2000, 2002 and 2004-2020 have been published (see References). No surveys were conducted in 1993 and 2001. In 2003, the survey was completed by dry bean producers who attended the Northarvest Bean Day in Fargo during the winter. However, the lack of responses made processing and analyses of results unreliable, so no report was compiled.

Data reported in the figures represent totals for the entire Northarvest survey unless otherwise noted. Data reported in the tables are broken down by state and also are totaled for the entire Northarvest survey. Percent values in tables and figures are rounded to one decimal for clear presentation. Consequently, percent values in some tables and figures may not total exactly 100 (for example, 99.9 or 100.1) when the presented values are added. Other instances in which percent values do not total 100 are explained in footnotes to the tables.

Throughout this report, trade names of chemicals often are presented as an aid for clearer communication. Mention of trade names does not constitute endorsement or recommendation by NDSU or the Northarvest Bean Growers Association.

Production

Table 1. Number of Northarvest dry bean growers responding, acres planted by respondents and total state acres in 2021.

Growers	No. of respondents	Respondents' acres	Total acres[a]	Acres surveyed (% of total)
Minnesota	75	38,240	240,000	15.9
North Dakota	116	84,582	660,000	12.8
Northarvest	191	122,822	900,000	13.6

[a]Total of dry bean acres planted for Minnesota and North Dakota (source: USDA National Agricultural Statistics Service).

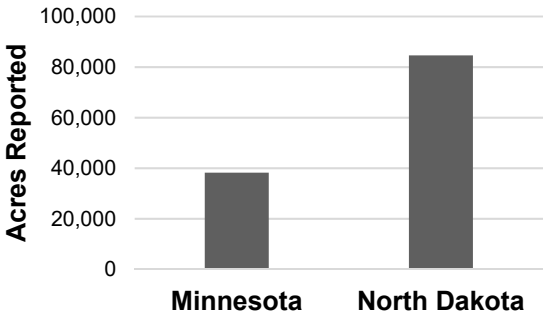

Figure 1. Northarvest dry bean acres planted by state in 2021 (respondents' acres only).

Table 2. Dry bean production by county in 2021.

Minnesota	No. of respon-dents[a]	Acres[b]	North Dakota	No. of respon-dents[a]	Acres[b]
Otter Tail	9	7,332	Wells	10	10,380
Polk	9	3,979	Grand Forks	16	8,414
Pope	4	2,955	Pembina	13	8,027
Mahnomen	6	2,788	Steele	10	6,992
Stevens	4	2,532	Benson	8	6,924
Stearns	4	2,270	Walsh	15	6,905
Swift	7	2,242	Traill	9	5,413
Marshall	6	1,817	Cass	7	4,776
Norman	4	1,630	Nelson	4	4,672
Wadena	3	1,360	McLean	4	4,260
Becker	3	1,189	Ramsey	7	4,148
Hubbard	1	1,115	Ransom	5	3,764
Traverse	2	930	Cavalier	6	1,845
Chippewa	3	857	Pierce	4	1,625
McLeod	2	818	Barnes	3	1,160
Kandiyohi	4	745	Dickey	1	657
Benton	1	652	Towner	1	620
Pennington	1	600	LaMoure	1	602
Renville	4	462	Richland	1	580
Clay	2	352	Bottineau	1	450
Sherburne	1	350	Stutsman	1	420
Morrison	2	341	Ward	1	390
Grant	1	332	Mercer	1	280
Lyon	1	200	Logan	2	274
Dakota	1	185	Eddy	2	260
Douglas	1	130	Oliver	1	250
Wilkin	1	77	Griggs	1	180
			Sheridan	1	150
			McIntosh	1	84
			Rolette	1	80
Total		**38,240**	**Total**		**84,582**

[a]Some respondents had dry bean acreage in more than one county.
[b]Respondents' acres only.

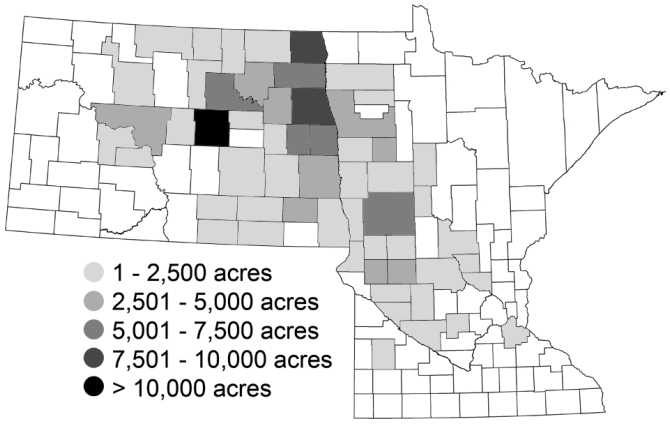

Figure 2. Northarvest dry bean production by county in 2021 (respondents' acres only).

Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground, affected by drought, and damaged by water in 2021.

	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Planted	38,240	100
Harvested	37,876	99
Irrigated	15,381	40.2
Tile-drained	8,684	22.7
Drought (average reported yield loss = 35%)	17,964	47
Water damage (beans harvested)	180	0.5
Water damage (beans not harvested)	0	0
North Dakota		
Planted	84,582	100
Harvested	80,447	95.1
Irrigated	3,040	3.6
Tile-drained	7,768	9.2
Drought (average reported yield loss = 49%)	71,769	84.9
Water damage (beans harvested)	20	0
Water damage (beans not harvested)	20	0
Northarvest		
Planted	122,822	100
Harvested	118,323	96.3
Irrigated	18,421	15
Tile-drained	16,452	13.4
Drought (average reported yield loss = 42%)	89,733	73.1
Water damage (beans harvested)	200	0.2
Water damage (beans not harvested)	20	0

[a]Respondents' acres only.

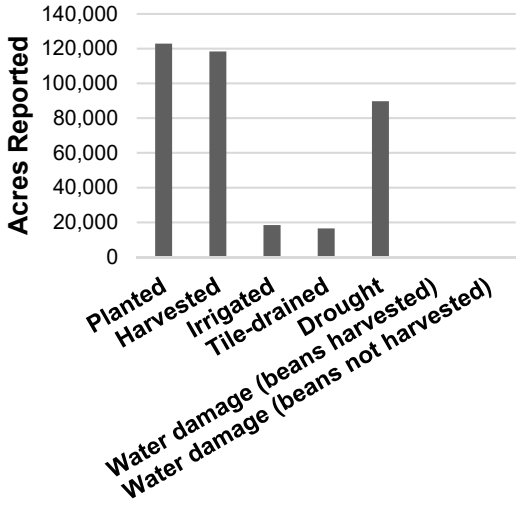

Figure 3. Northarvest respondents' reported acres from Table 3.

Table 4. Dry bean market classes grown in 2021.

Market class	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Kidney	17,948	46.9
Black	11,351	29.7
Navy	7,764	20.3
Pinto	1,050	2.7
Small Red	127	0.3
Total	**38,240**	**100**
North Dakota		
Pinto	58,980	69.7
Black	10,568	12.5
Navy	7,691	9.1
Small Red	4,978	5.9
Great Northern	1,251	1.5
Kidney	804	1
Pink	310	0.4
Total	**84,582**	**100**
Northarvest		
Pinto	60,030	48.9
Black	21,919	17.8
Kidney	18,752	15.3
Navy	15,455	12.6
Small Red	5,105	4.2
Great Northern	1,251	1
Pink	310	0.3
Total	**122,822**	**100**

[a]Respondents' acres only.

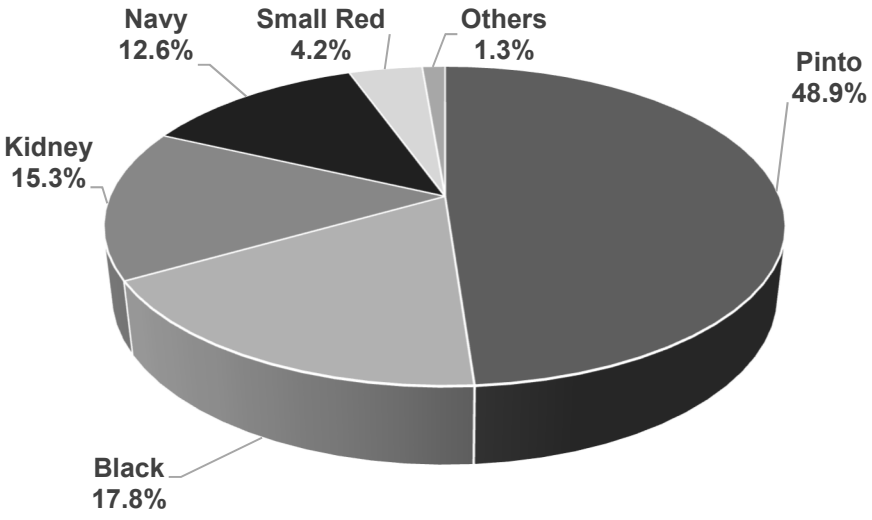

Figure 4. Northarvest dry bean market classes grown in 2021.

Table 5. Dry bean varieties grown in 2021.

Variety	Class	Minnesota[a]	%[b]	North Dakota[a]	%[b]	Northarvest[a]	%[b]
Eclipse	Black	7,301	19.1	5,400	6.4	12,701	10.3
Black Tails	Black	1,425	3.7	4,199	5	5,624	4.6
Zorro	Black	984	2.6	40	0	1,024	0.8
Blackbeard	Black	689	1.8	0	0	689	0.6
Black Cat	Black	77	0.2	519	0.6	596	0.5
ND Twilight	Black	252	0.7	325	0.4	577	0.5
Spectre	Black	403	1.1	0	0	403	0.3
Black Bear	Black	220	0.6	0	0	220	0.2
Zenith	Black	0	0	85	0.1	85	0.1
Total Black	**Black**	**11,351**	**29.7**	**10,568**	**12.5**	**21,919**	**17.8**
ND Pegasus	GN[c]	0	0	477	0.6	477	0.4
AAC Tundra	GN[c]	0	0	324	0.4	324	0.3
Draco	GN[c]	0	0	300	0.4	300	0.2
ADM-14164	GN[c]	0	0	150	0.2	150	0.1
Total GN[c]	GN[c]	**0**	**0**	**1,251**	**1.5**	**1,251**	**1**
Montcalm	Kidney	3,406	8.9	100	0.1	3,506	2.9
Dynasty	Kidney	3,038	7.9	316	0.4	3,354	2.7
Pink Panther	Kidney	3,192	8.3	0	0	3,192	2.6
Beluga	Kidney	1,991	5.2	0	0	1,991	1.6
Red Rover	Kidney	1,296	3.4	138	0.2	1,434	1.2
Clouseau	Kidney	1,378	3.6	0	0	1,378	1.1
Red Hawk	Kidney	1,185	3.1	0	0	1,185	1
Epic	Kidney	830	2.2	0	0	830	0.7
Cabernet	Kidney	250	0.7	250	0.3	500	0.4
Talon	Kidney	310	0.8	0	0	310	0.3
CELRK	Kidney	280	0.7	0	0	280	0.2
Rampart	Kidney	232	0.6	0	0	232	0.2
Big Red	Kidney	200	0.5	0	0	200	0.2
Red Dawn	Kidney	155	0.4	0	0	155	0.1
Red Cedar	Kidney	145	0.4	0	0	145	0.1
Spire	Kidney	40	0.1	0	0	40	0
ND Whitetail	Kidney	20	0.1	0	0	20	0
Total Kidney	**Kidney**	**17,948**	**46.9**	**804**	**1**	**18,752**	**15.3**
HMS Medalist	Navy	2,940	7.7	4,449	5.3	7,389	6
T-9905	Navy	3,129	8.2	2,248	2.7	5,377	4.4
Blizzard	Navy	350	0.9	619	0.7	969	0.8
Armada	Navy	523	1.4	0	0	523	0.4
Apex	Navy	320	0.8	0	0	320	0.3
HMS Bounty	Navy	301	0.8	0	0	301	0.2
Alpena	Navy	126	0.3	133	0.2	259	0.2
Valiant	Navy	0	0	210	0.2	210	0.2
Liberty	Navy	75	0.2	32	0	107	0.1
Total Navy	**Navy**	**7,764**	**20.3**	**7,691**	**9.1**	**15,455**	**12.6**
Floyd	Pink	0	0	190	0.2	190	0.2
Magnolia	Pink	0	0	120	0.1	120	0.1
Total Pink	**Pink**	**0**	**0**	**310**	**0.4**	**310**	**0.3**
Torreon	Pinto	0	0	10,921	12.9	10,921	8.9
La Paz	Pinto	0	0	10,833	12.8	10,833	8.8
Monterrey	Pinto	550	1.4	9,560	11.3	10,110	8.2
Vibrant (SD)[d]	Pinto	220	0.6	8,247	9.8	8,467	6.9
Windbreaker	Pinto	0	0	5,530	6.5	5,530	4.5
ND Falcon	Pinto	0	0	2,359	2.8	2,359	1.9
Radiant (SD)[d]	Pinto	0	0	2,305	2.7	2,305	1.9
Cowboy	Pinto	0	0	2,237	2.6	2,237	1.8
ND-307	Pinto	80	0.2	1,420	1.7	1,500	1.2
Lariat	Pinto	0	0	1,435	1.7	1,435	1.2
Gleam (SD)[d]	Pinto	200	0.5	900	1.1	1,100	0.9
Santa Cruz	Pinto	0	0	1,100	1.3	1,100	0.9
ND Palomino (SD)[d]	Pinto	0	0	1,083	1.3	1,083	0.9
Pinto (not specified)	Pinto	0	0	400	0.5	400	0.3
Lumen (SD)[d]	Pinto	0	0	330	0.4	330	0.3
Sinaloa	Pinto	0	0	200	0.2	200	0.2
Mystic (SD)[d]	Pinto	0	0	120	0.1	120	0.1
Total Pinto	**Pinto**	**1,050**	**2.7**	**58,980**	**69.7**	**60,030**	**48.9**
Ruby	Small Red	127	0.3	2,659	3.1	2,786	2.3
Viper	Small Red	0	0	2,200	2.6	2,200	1.8
Merlot	Small Red	0	0	79	0.1	79	0.1
Cayenne	Small Red	0	0	40	0	40	0
Total Small Red	**Small Red**	**127**	**0.3**	**4,978**	**5.9**	**5,105**	**4.2**
Grand Total	**All Classes**	**38,240**	**100**	**84,582**	**100**	**122,822**	**100**

[a]Respondents' acres only. [b]Percent of respondents' total dry bean acreage. [c]GN = Great Northern. [d](SD) = Slow darkening pinto

Table 6. Are slow-darkening (SD) pinto varieties a good alternative to regular darkening pinto varieties for pinto bean production in the Northarvest production region?

Response	Respondents (no.)[a]	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[b]
Minnesota				
Yes	2	50	650	61.9
No	1	25	320	30.5
I don't know	1	25	80	7.6
Total	**4**	**100**	**1,050**	**100**
North Dakota				
Yes	37	43	23,164	41.3
No	26	30.2	19,102	34.1
I don't know	23	26.7	13,794	24.6
Total	**86**	**100**	**56,060**	**100**
Northarvest				
Yes	39	43.3	23,814	41.7
No	27	30	19,422	34
I don't know	24	26.7	13,874	24.3
Total	**90**	**100**	**57,110**	**100**

[a]Respondents who grew pinto beans in 2021.
[b]2021 pinto bean production acres only.

Table 7. If more seed of SD pintos was available, would you grow more SD pintos compared with regular darkening pintos?

Response	Respondents (no.)[a]	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[b]
Minnesota				
Yes	2	50	520	49.5
No	2	50	530	50.5
Total	**4**	**100**	**1,050**	**100**
North Dakota				
Yes	30	36.1	14,953	28
No	53	63.9	38,442	72
Total	**83**	**100**	**53,395**	**100**
Northarvest				
Yes	32	36.8	15,473	28.4
No	55	63.2	38,972	71.6
Total	**87**	**100**	**54,445**	**100**

[a]Respondents who grew pinto beans in 2021.
[b]2021 pinto bean production acres only.

Table 8. What are the main limitations for increased SD pinto production in our area?

Reason	Minnesota Respondents (no.)[a]	Minnesota Respondents (%)[b]	North Dakota Respondents (no.)[a]	North Dakota Respondents (%)[b]	Northarvest Respondents (no.)[a]	Northarvest Respondents (%)[b]
Market price	2	50	38	44.7	40	44.9
Poor agronomic performance of SD varieties	0	0	39	45.9	39	43.8
Seed availability	2	50	15	17.6	17	19.1
Lack of markets	1	25	13	15.3	14	15.7
Lack of grower knowledge about benefits of SD pintos	1	25	13	15.3	14	15.7
Lack of consumer knowledge about benefits of SD pintos	1	25	11	12.9	12	13.5
Seed price	0	0	8	9.4	8	9
Lack of industry knowledge about benefits of SD pintos	0	0	5	5.9	5	5.6
Storing SD varieties separately	0	0	2	2.4	2	2.2

[a]Respondents who grew pinto beans in 2021.
[b]Percentages do not total 100 because respondents could choose multiple responses.

Table 9. Dry bean production problems reported in 2021.

Production problem	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Drought (average reported yield loss = 35%)	52	69.3	17,964	47
Wind	13	17.3	5,371	14
Diseases	14	18.7	4,755	12.4
Hail	13	17.3	2,393	6.3
Spring frost	9	12	2,339	6.1
Weeds	16	21.3	2,332	6.1
Harvest	10	13.3	2,286	6
Insects	8	10.7	2,076	5.4
Emergence/stand	13	17.3	1,910	5
Applied herbicide injury	7	9.3	1,705	4.5
Herbicide carryover injury	6	8	1,106	2.9
Delayed planting	2	2.7	632	1.7
Herbicide drift injury	4	5.3	415	1.1
Soil salinity	2	2.7	210	0.5
Fall frost	2	2.7	205	0.5
Water damage (beans harvested)	4	5.3	180	0.5
Seeding	1	1.3	140	0.4
North Dakota				
Drought (average reported yield loss = 49%)	110	94.8	71,769	84.9
Wind	30	25.9	9,282	11
Weeds	34	29.3	7,128	8.4
Spring frost	13	11.2	6,137	7.3
Emergence/stand	18	15.5	5,846	6.9
Applied herbicide injury	6	5.2	5,473	6.5
Hail	16	13.8	3,929	4.6
Fall frost	9	7.8	3,749	4.4
Herbicide carryover injury	1	0.9	3,350	4
Harvest	7	6	3,268	3.9
Herbicide drift injury	4	3.4	3,163	3.7
Soil salinity	37	31.9	2,770	3.3
Diseases	10	8.6	2,001	2.4
Delayed planting	2	1.7	1,900	2.2
Insects	8	6.9	1,365	1.6
Seeding	2	1.7	900	1.1
Micronutrient deficiency	2	1.7	135	0.2
Regrowth after maturity	1	0.9	75	0.1
Water damage (beans harvested)	2	1.7	20	0
Water damage (beans not harvested)	2	1.7	20	0
Northarvest				
Drought (average reported yield loss = 42%)	162	84.8	89,733	73.1
Wind	43	22.5	14,653	11.9
Weeds	50	26.2	9,460	7.7
Spring frost	22	11.5	8,476	6.9
Emergence/stand	31	16.2	7,756	6.3
Applied herbicide injury	13	6.8	7,178	5.8
Diseases	24	12.6	6,756	5.5
Hail	29	15.2	6,322	5.1
Harvest	17	8.9	5,554	4.5
Herbicide carryover injury	7	3.7	4,456	3.6
Fall frost	11	5.8	3,954	3.2
Herbicide drift injury	8	4.2	3,578	2.9
Insects	16	8.4	3,441	2.8
Soil salinity	39	20.4	2,980	2.4
Delayed planting	4	2.1	2,532	2.1
Seeding	3	1.6	1,040	0.8
Water damage (beans harvested)	6	3.1	200	0.2
Micronutrient deficiency	2	1	135	0.1
Regrowth after maturity	1	0.5	75	0.1
Water damage (beans not harvested)	2	1	20	0

[a]Respondents' acres only.

Table 10. Row spacing by dry bean market class in 2021.

	Black[a]		Great Northern		Kidney		Navy[a]		Pink		Pinto[a]		Small Red	
Row spacing	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Minnesota														
< 11 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 to 15 inches	2	6.3	0	0	0	0	1	4.2	0	0	0	0	0	0
16 to 20 inches	1	3.1	0	0	0	0	2	8.3	0	0	0	0	0	0
21 to 25 inches	24	75	0	0	7	28	16	66.7	0	0	3	75	0	0
26 to 30 inches	4	12.5	0	0	18	72	5	20.8	0	0	1	25	1	100
> 30 inches	1	3.1	0	0	0	0	0	0	0	0	0	0	0	0
Total	**32**	**100**	**0**	**0**	**25**	**100**	**24**	**100**	**0**	**0**	**4**	**100**	**1**	**100**
North Dakota														
< 11 inches	1	4.3	0	0	0	0	0	0	0	0	5	5.7	0	0
11 to 15 inches	4	17.4	0	0	0	0	1	6.3	0	0	7	8	0	0
16 to 20 inches	1	4.3	1	20	0	0	0	0	0	0	9	10.2	0	0
21 to 25 inches	12	52.2	3	60	1	33.3	11	68.8	2	100	32	36.4	3	37.5
26 to 30 inches	5	21.7	1	20	2	66.7	4	25	0	0	35	39.8	5	62.5
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**23**	**100**	**5**	**100**	**3**	**100**	**16**	**100**	**2**	**100**	**88**	**100**	**8**	**100**
Northarvest														
< 11 inches	1	1.8	0	0	0	0	0	0	0	0	5	5.4	0	0
11 to 15 inches	6	10.9	0	0	0	0	2	5	0	0	7	7.6	0	0
16 to 20 inches	2	3.6	1	20	0	0	2	5	0	0	9	9.8	0	0
21 to 25 inches	36	65.5	3	60	8	28.6	27	67.5	2	100	35	38	3	33.3
26 to 30 inches	9	16.4	1	20	20	71.4	9	22.5	0	0	36	39.1	6	66.7
> 30 inches	1	1.8	0	0	0	0	0	0	0	0	0	0	0	0
Total	**55**	**100**	**5**	**100**	**28**	**100**	**40**	**100**	**2**	**100**	**92**	**100**	**9**	**100**

[a]Black, navy and pinto varieties are typically Type II (upright) varieties.

Table 11. Seeding rate by dry bean market class in 2021.

	Black[b]		Great Northern		Kidney		Navy[b]		Pink		Pinto[b]		Red	
Seeding rate[a]	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Minnesota														
60 to 69,000	0	0	0	0	1	4	0	0	0	0	0	0	0	0
70 to 79,000	1	3.2	0	0	6	24	0	0	0	0	1	33.3	0	0
80 to 89,000	1	3.2	0	0	11	44	1	4.3	0	0	2	66.7	0	0
90 to 99,000	1	3.2	0	0	6	24	0	0	0	0	0	0	1	100
100 to 109,000	3	9.7	0	0	1	4	6	26.1	0	0	0	0	0	0
110 to 119,000	18	58.1	0	0	0	0	10	43.5	0	0	0	0	0	0
120 to 129,000	7	22.6	0	0	0	0	4	17.4	0	0	0	0	0	0
130 to 139,000	0	0	0	0	0	0	1	4.3	0	0	0	0	0	0
> 139,000	0	0	0	0	0	0	1	4.3	0	0	0	0	0	0
Total	**31**	**100**	**0**	**0**	**25**	**100**	**23**	**100**	**0**	**0**	**3**	**100**	**1**	**100**
North Dakota														
60 to 69,000	0	0	0	0	0	0	0	0	0	0	2	2.5	0	0
70 to 79,000	0	0	4	66.7	0	0	0	0	2	100	33	41.3	0	0
80 to 89,000	0	0	1	16.7	3	100	0	0	0	0	32	40	5	71.4
90 to 99,000	1	5	1	16.7	0	0	1	6.7	0	0	10	12.5	2	28.6
100 to 109,000	2	10	0	0	0	0	3	20	0	0	0	0	0	0
110 to 119,000	12	60	0	0	0	0	7	46.7	0	0	1	1.3	0	0
120 to 129,000	4	20	0	0	0	0	4	26.7	0	0	1	1.3	0	0
130 to 139,000	1	5	0	0	0	0	0	0	0	0	0	0	0	0
> 139,000	0	0	0	0	0	0	0	0	0	0	1	1.3	0	0
Total	**20**	**100**	**6**	**100**	**3**	**100**	**15**	**100**	**2**	**100**	**80**	**100**	**7**	**100**
Northarvest														
60 to 69,000	0	0	0	0	1	3.6	0	0	0	0	2	2.4	0	0
70 to 79,000	1	2	4	66.7	6	21.4	0	0	2	100	34	41	0	0
80 to 89,000	1	2	1	16.7	14	50	1	2.6	0	0	34	41	5	62.5
90 to 99,000	2	3.9	1	16.7	6	21.4	1	2.6	0	0	10	12	3	37.5
100 to 109,000	5	9.8	0	0	1	3.6	9	23.7	0	0	0	0	0	0
110 to 119,000	30	58.8	0	0	0	0	17	44.7	0	0	1	1.2	0	0
120 to 129,000	11	21.6	0	0	0	0	8	21.1	0	0	1	1.2	0	0
130 to 139,000	1	2	0	0	0	0	1	2.6	0	0	0	0	0	0
> 139,000	0	0	0	0	0	0	1	2.6	0	0	1	1.2	0	0
Total	**51**	**100**	**6**	**100**	**28**	**100**	**38**	**100**	**2**	**100**	**83**	**100**	**8**	**100**

[a]Live seeds per acre.
[b]Black, navy and pinto varieties are typically Type II (upright) varieties.

Table 12. Percent of total dry bean acres harvested by direct combining in 2021.

Percent direct combined	Respondents (no.)	Respondents (%)	Acres reported[a]	Acres reported[a] (%)
Minnesota				
1 to 25%	1	1.3	350	0.9
26 to 50%	1	1.3	511	1.3
51 to 75%	3	4	1,770	4.7
76 to 99%	6	8	1,880	5
100%	40	53.3	14,750	38.9
No direct harvest	24	32	18,615	49.1
Total	**75**	**100**	**37,876**	**100**
North Dakota				
1 to 25%	3	2.7	1,858	2.3
26 to 50%	2	1.8	3,150	3.9
51 to 75%	8	7.1	6,502	8.1
76 to 99%	16	14.2	12,723	15.8
100%	75	66.4	51,441	63.9
No direct harvest	9	8	4,773	5.9
Total	**113**	**100**	**80,447**	**100**
Northarvest				
1 to 25%	4	2.1	2,208	1.9
26 to 50%	3	1.6	3,661	3.1
51 to 75%	11	5.9	8,272	7
76 to 99%	22	11.7	14,603	12.3
100%	115	61.2	66,191	55.9
No direct harvest	33	17.6	23,388	19.8
Total	**188**	**100**	**118,323**	**100**

[a]Respondents' harvested acres only.

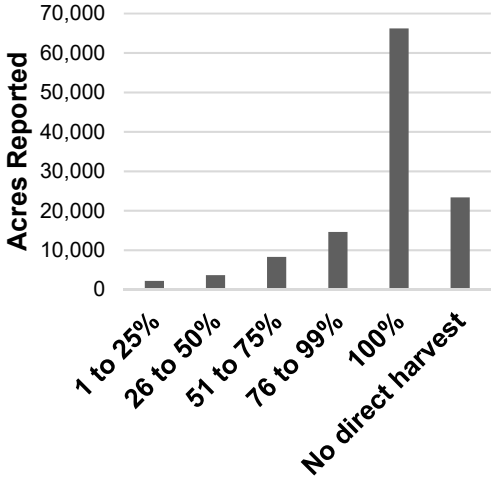

Figure 5. Northarvest percent of dry bean acres harvested by direct combining in 2021.

Table 13. Estimated yield loss in harvested dry beans in 2021.

	Direct Harvest		Conventional Harvest	
Estimated yield loss	Respondents (no.)	Respondents (%)	Respondents (no.)	Respondents (%)
Minnesota				
1 to 5%	26	51	24	68.6
6 to 10%	22	43.1	10	28.6
11 to 15%	2	3.9	1	2.9
16 to 20%	1	2	0	0
Total	**51**	**100**	**35**	**100**
North Dakota				
1 to 5%	42	41.2	27	71.1
6 to 10%	41	40.2	9	23.7
11 to 15%	16	15.7	2	5.3
16 to 20%	3	2.9	0	0
Total	**102**	**100**	**38**	**100**
Northarvest				
1 to 5%	68	44.4	51	69.9
6 to 10%	63	41.2	19	26
11 to 15%	18	11.8	3	4.1
16 to 20%	4	2.6	0	0
Total	**153**	**100**	**73**	**100**

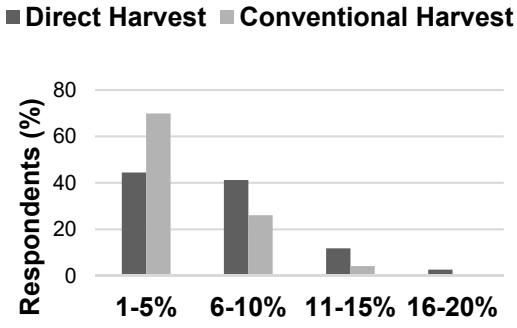

Figure 6. Northarvest estimated yield loss in harvested dry beans in 2021.

Table 14. Dry bean field tillage practices in 2021.

Tillage practice	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Conventional	33,779	88.3
Minimum	4,119	10.8
Strip-tillage	270	0.7
No-till	72	0.2
Total	**38,240**	**100**
North Dakota		
Conventional	45,031	53.3
Minimum	20,003	23.7
No-till	14,414	17.1
Strip-tillage	4,989	5.9
Total	**84,437**	**100**
Northarvest		
Conventional	78,810	64.2
Minimum	24,122	19.7
No-till	14,486	11.8
Strip-tillage	5,259	4.3
Total	**122,677**	**100**

[a]Respondents' acres only.

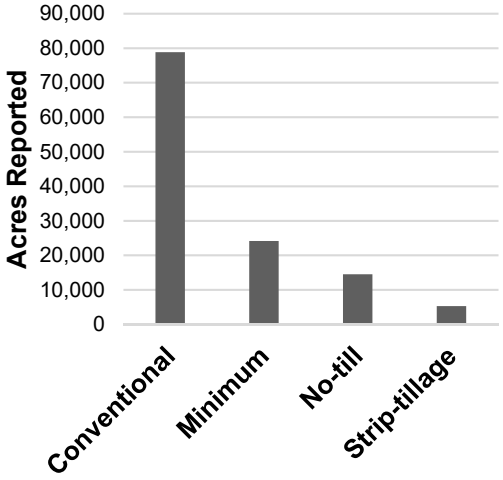

Figure 7. Northarvest dry bean field tillage practices in 2021.

Agronomy

Table 15. Cover crop use on dry bean fields in 2021.

Cover crop use	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Yes	33	44	21,427	56
No	42	56	16,813	44
Total	**75**	**100**	**38,240**	**100**
North Dakota				
Yes	25	21.7	23,029	27.3
No	90	78.3	61,401	72.7
Total	**115**	**100**	**84,430**	**100**
Northarvest				
Yes	58	30.5	44,456	36.2
No	132	69.5	78,214	63.8
Total	**190**	**100**	**122,670**	**100**

[a]Respondents' acres only.

Table 16. Reasons for cover crop use on dry bean fields in 2021.

Cover crop practice	Respondents (no.)	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[a,b]
Minnesota				
Reduce soil erosion	31	100	20,922	100
Improve soil health	20	64.5	12,618	60.3
Weed control	10	32.3	7,716	36.9
Soil moisture conservation	5	16.1	2,702	12.9
North Dakota				
Reduce soil erosion	22	91.7	21,161	95.2
Improve soil health	15	62.5	14,529	65.4
Soil moisture conservation	11	45.8	11,854	53.3
Weed control	10	41.7	9,102	40.9
Northarvest				
Reduce soil erosion	53	96.4	42,083	97.5
Improve soil health	35	63.6	27,147	62.9
Weed control	20	36.4	16,818	39
Soil moisture conservation	16	29.1	14,556	33.7

[a]Percentages do not total 100% because some respondents gave more than one reason.
[b]Respondents' acres only.

Table 17. Seasonal use of cover crops on dry bean fields in 2021.

Cover crop seasonal use	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
After dry bean harvest	26	81.3	14,294	68
Prior to planting and after dry bean harvest	5	15.6	6,416	30.5
Prior to planting dry beans	1	3.1	312	1.5
Total	**32**	**100**	**21,022**	**100**
North Dakota				
After dry bean harvest	13	54.2	13,588	61.1
Prior to planting dry beans	7	29.2	6,058	27.3
Prior to planting and after dry bean harvest	2	8.3	1,130	5.1
Prior to planting and during dry bean production	1	4.2	1,055	4.7
During dry bean production and after harvest	1	4.2	398	1.8
Total	**24**	**100**	**22,229**	**100**
Northarvest				
After dry bean harvest	39	69.6	27,882	64.5
Prior to planting and after dry bean harvest	7	12.5	7,546	17.4
Prior to planting dry beans	8	14.3	6,370	14.7
Prior to planting and during dry bean production	1	1.8	1,055	2.4
During dry bean production and after harvest	1	1.8	398	0.9
Total	**56**	**100**	**43,251**	**100**

[a]Respondents' acres only.

Table 18. Cover crop species composition on dry bean fields in 2021.

Cover crop species composition	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Cereal grass species only	29	90.6	20,122	95.7
Cereal grass + broadleaf species	3	9.4	900	4.3
Broadleaf species only	0	0	0	0
Total	**32**	**100**	**21,022**	**100**
North Dakota				
Cereal grass species only	22	91.7	21,226	95.5
Cereal grass + broadleaf species	1	4.2	518	2.3
Broadleaf species only	1	4.2	485	2.2
Total	**24**	**100**	**22,229**	**100**
Northarvest				
Cereal grass species only	51	91.1	41,348	95.6
Cereal grass + broadleaf species	4	7.1	1,418	3.3
Broadleaf species only	1	1.8	485	1.1
Total	**56**	**100**	**43,251**	**100**

[a]Respondents' acres only.

Table 19. Ground rolling on dry bean fields in 2021.

Timing	Respondents (no.)	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[a,b]
Minnesota				
Pre-plant	9	12	3,271	8.6
Pre-emerge	30	40	9,316	24.4
Post-emerge	3	4	1,930	5
Did not roll	40	53.3	23,723	62
Total			**38,240**	
North Dakota				
Pre-plant	13	11.5	7,261	8.7
Pre-emerge	73	64.6	52,783	63.2
Post-emerge	7	6.2	3,729	4.5
Did not roll	40	35.4	20,441	24.5
Total			**84,214**	
Northarvest				
Pre-plant	22	11.7	10,532	8.6
Pre-emerge	103	54.8	62,099	51
Post-emerge	10	5.3	5,659	4.6
Did not roll	80	42.6	44,164	36.3
Total			**122,454**	

[a]Percentages do not total 100% because some respondents practiced more than one timing.
[b]Respondents' acres only.

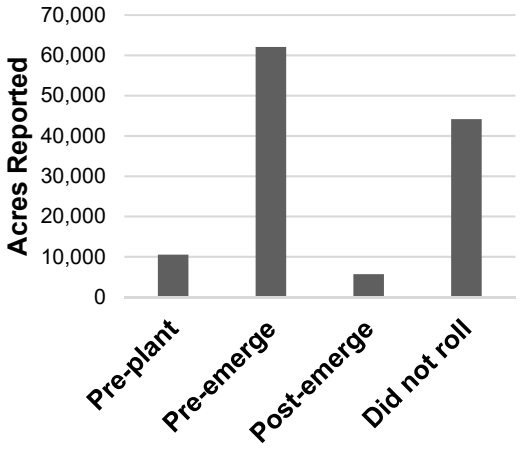

Figure 8. Northarvest ground rolling on dry bean fields in 2021.

Table 20. Ground rolling and direct harvest on dry bean fields in 2021.

	Ground Rolling			
Percent Direct Combined	**Yes**		**No**	
Minnesota	**Respondents (no.)**	**Respondents (%)**	**Respondents (no.)**	**Respondents (%)**
0%	0	0	24	70.6
1 to 25%	1	2.4	0	0
26 to 50%	1	2.4	0	0
51 to 75%	3	7.3	0	0
76 to 99%	2	4.9	4	11.8
100%	34	82.9	6	17.6
Total	**41**	**100**	**34**	**100**
North Dakota				
0%	1	1.1	8	30.8
1 to 25%	1	1.1	2	7.7
26 to 50%	1	1.1	1	3.8
51 to 75%	7	8	1	3.8
76 to 99%	13	14.9	3	11.5
100%	64	73.6	11	42.3
Total	**87**	**100**	**26**	**100**
Northarvest				
0%	1	0.8	32	53.3
1 to 25%	2	1.6	2	3.3
26 to 50%	2	1.6	1	1.7
51 to 75%	10	7.8	1	1.7
76 to 99%	15	11.7	7	11.7
100%	98	76.6	17	28.3
Total	**128**	**100**	**60**	**100**

Table 21. Use of fertilizers on dry bean fields in 2021.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Nitrogen	63	98.4
Phosphorus	60	93.8
Potash	52	81.3
Zinc	43	67.2
Sulfur	44	68.8
North Dakota		
Nitrogen	91	91
Phosphorus	89	89
Potash	38	38
Zinc	65	65
Sulfur	30	30
Northarvest		
Nitrogen	154	75.5
Phosphorus	149	73
Potash	90	44.1
Zinc	108	52.9
Sulfur	74	36.3

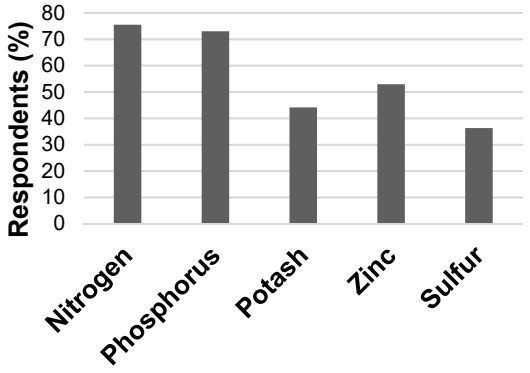

Figure 9. Northarvest use of fertilizers on dry bean fields in 2021.

Table 22. Fertilizer application methods on dry bean fields in 2021.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota	**74**	
Broadcast	64	86.5
In-furrow	35	47.3
Banded	14	18.9
Foliar	12	16.2
North Dakota	**111**	
Broadcast	89	80.2
In-furrow	51	45.9
Banded	19	17.1
Foliar	6	5.4
Northarvest	**185**	
Broadcast	153	82.7
In-furrow	86	46.5
Banded	33	17.8
Foliar	18	9.7

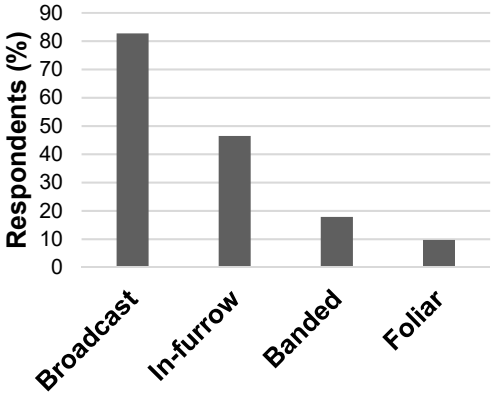

Figure 10. Northarvest fertilizer application methods on dry bean fields in 2021.

Table 23. Use of soil test prior to fertilization of dry bean fields in 2021.

Soil test	Respondents (no.)	Respondents (%)
Minnesota		
Soil test used	56	78.9
Soil test not used	15	21.1
Total	**71**	**100**
North Dakota		
Soil test used	89	80.2
Soil test not used	22	19.8
Total	**111**	**100**
Northarvest		
Soil test used	145	79.7
Soil test not used	37	20.3
Total	**182**	**100**

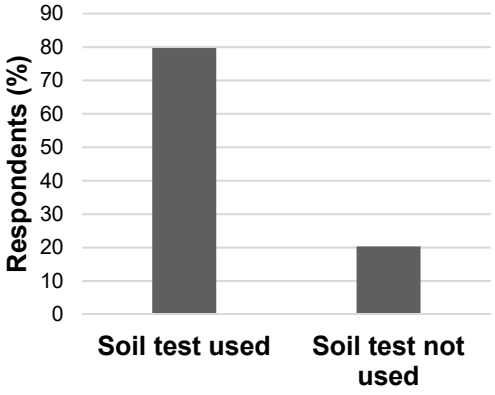

Figure 11. Northarvest use of soil test in 2021.

Table 24. Use of *Rhizobium* inoculants on dry bean fields in 2021.

Rhizobium use	Respondents (no.)	Respondents (%)
Minnesota		
Inoculant used	18	28.1
Inoculant not used	46	71.9
Total	**64**	**100**
North Dakota		
Inoculant used	19	19
Inoculant not used	81	81
Total	**100**	**100**
Northarvest		
Inoculant used	37	22.6
Inoculant not used	127	77.4
Total	**164**	**100**

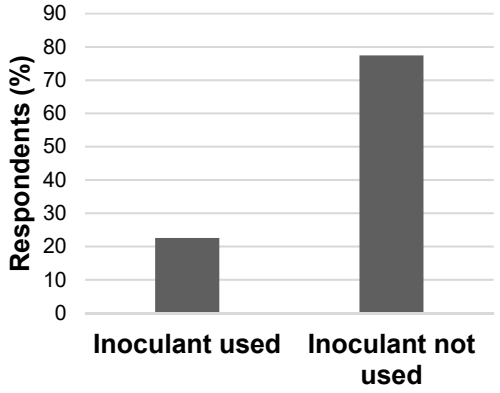

Figure 12. Northarvest use of inoculant in 2021.

Table 25. Use of site-specific nutrient management (SSNM) on dry bean fields in 2021.

	Respondents (no.)	Respondents (%)
Minnesota		
SSNM used	23	34.8
SSNM not used	43	65.2
Total	**66**	**100**
North Dakota		
SSNM used	34	31.8
SSNM not used	73	68.2
Total	**107**	**100**
Northarvest		
SSNM used	57	32.9
SSNM not used	116	67.1
Total	**173**	**100**

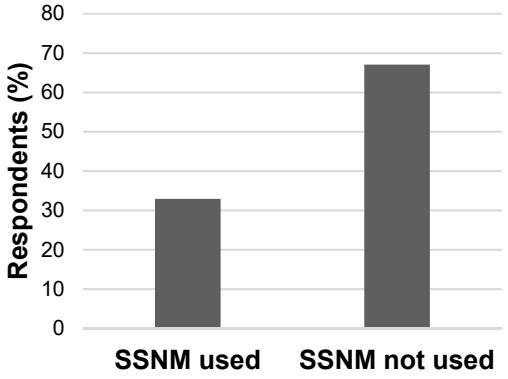

Figure 13. Northarvest use of site-specific nutrient management in 2021.

Table 26. Desiccants used on dry beans in 2021.

Desiccant	Respondents (no.)	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[a,b]
Minnesota				
Sharpen	53	73.6	22,859	63.1
Valor	12	16.7	8,200	22.6
Paraquat	17	23.6	7,967	22
None used	15	20.8	4,378	12.1
Glyphosate	1	1.4	395	1.1
Aim	1	1.4	355	1
Sodium chlorate	1	1.4	80	0.2
Desiccant Total			**39,856**	
North Dakota				
Sharpen	70	65.4	45,440	56.2
Valor	27	25.2	25,223	31.2
Paraquat	41	38.3	23,621	29.2
Glyphosate	24	22.4	18,884	23.4
None used	16	15	8,606	10.6
Aim	2	1.9	4,273	5.3
Desiccant Total			**117,441**	
Northarvest				
Sharpen	123	68.7	68,299	58.3
Valor	39	21.8	33,423	28.5
Paraquat	58	32.4	31,588	27
Glyphosate	25	14	19,279	16.5
None used	31	17.3	12,984	11.1
Aim	3	1.7	4,628	4
Sodium chlorate	1	0.6	80	0.1
Desiccant Total			**157,297**	

[a]Percentages do not total 100% because some respondents used more than one desiccant.
[b]Respondents' acres only.

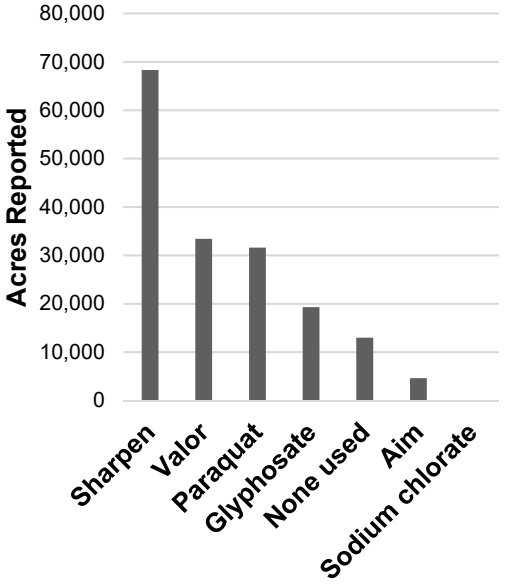

Figure 14. Northarvest desiccants used on dry beans in 2021.

Table 27. Desiccant tank mixes used on dry beans in 2021.

Desiccant Combination	Respondents (no.)	Acres reported (no.)
Minnesota		
Paraquat + Sharpen	8	5,495
Paraquat + Valor	1	950
Aim + Sharpen	1	355
Glyphosate + Paraquat + Sharpen	1	300
North Dakota		
Paraquat + Sharpen	16	12,366
Glyphosate + Valor	4	8,450
Glyphosate + Sharpen	13	7,547
Sharpen + Valor	5	4,302
Aim + Glyphosate + Valor	1	3,350
Paraquat + Valor	6	2,964
Paraquat + Sharpen + Valor	2	2,388
Glyphosate + Paraquat + Sharpen	3	998
Aim + Paraquat + Sharpen	1	923
Glyphosate + Paraquat	1	800
Northarvest		
Paraquat + Sharpen	24	17,861
Glyphosate + Valor	4	8,450
Glyphosate + Sharpen	13	7,547
Sharpen + Valor	5	4,302
Paraquat + Valor	7	3,914
Aim + Glyphosate + Valor	1	3,350
Paraquat + Sharpen + Valor	2	2,388
Glyphosate + Paraquat + Sharpen	4	1,298
Aim + Paraquat + Sharpen	1	923
Glyphosate + Paraquat	1	800
Aim + Sharpen	1	355

Table 28. Frequency of previous crops (2017-2020) in fields planted to dry beans in 2021.

Year	2020	2019	2018	2017	4-year average
Crop	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)
Minnesota					
Corn	66.7	33.8	43.2	41.2	46.2
Soybean	1.3	36.5	25.7	20.6	21
Dry Bean	6.7	13.5	21.6	32.4	18.5
Wheat	25.3	14.9	17.6	11.8	17.4
Sugarbeet	16	8.1	4.1	10.3	9.6
Potato	1.3	9.5	5.4	1.5	4.4
Alfalfa	0	0	2.7	2.9	1.4
No Crop	1.3	4.1	0	0	1.3
Barley	1.3	1.4	0	0	0.7
Field Pea	0	1.4	0	0	0.3
Hay/Grass	0	0	1.4	0	0.3
Oats	0	1.4	0	0	0.3
North Dakota					
Wheat	71.4	32.7	55.9	31.6	47.9
Corn	44.6	4.7	42.2	22.4	28.5
Dry Bean	2.7	37.4	15.7	43.9	24.9
Soybean	1.8	35.5	12.7	25.5	18.9
Sugarbeet	11.6	4.7	2.9	8.2	6.8
Barley	8.9	2.8	2.9	0	3.7
Canola	0	7.5	2	3.1	3.1
No Crop	2.7	1.9	2	3.1	2.4
Potato	0.9	2.8	1	1	1.4
Hay/Grass	0.9	0.9	1	1	1
Field Pea	0	0	2	1	0.7
Sunflower	0	0.9	0	2	0.7
Flax	0	0.9	0	0	0.2
Oats	0.9	0	0	0	0.2
Northarvest					
Corn	53.5	16.6	42.6	30.1	35.7
Wheat	52.9	25.4	39.8	23.5	35.4
Dry Bean	4.3	27.6	18.2	39.2	22.3
Soybean	1.6	35.9	18.2	23.5	19.8
Sugarbeet	13.4	6.1	3.4	9	8
Potato	1.1	5.5	2.8	1.2	2.7
Barley	5.9	2.2	1.7	0	2.4
No Crop	2.1	2.8	1.1	1.8	2
Canola	0	4.4	1.1	1.8	1.8
Hay/Grass	0.5	0.6	1.1	0.6	0.7
Alfalfa	0	0	1.1	1.2	0.6
Field Pea	0	0.6	1.1	0.6	0.6
Sunflower	0	0.6	0	1.2	0.4
Oats	0.5	0.6	0	0	0.3
Flax	0	0.6	0	0	0.1

Table 29. Number of years dry beans are grown in dry bean crop rotation program.

Number of years	Respondents (no.)	Respondents (%)
Minnesota		
1 of past 5 years	25	36.8
2 of past 5 years	37	54.4
3 of past 5 years	4	5.9
4 of past 5 years	1	1.5
5 of past 5 years	1	1.5
Total	**68**	**100**
North Dakota		
1 of past 5 years	32	33
2 of past 5 years	32	33
3 of past 5 years	32	33
4 of past 5 years	1	1
Total	**97**	**100**
Northarvest		
1 of past 5 years	57	34.5
2 of past 5 years	69	41.8
3 of past 5 years	36	21.8
4 of past 5 years	2	1.2
5 of past 5 years	1	0.6
Total	**165**	**100**

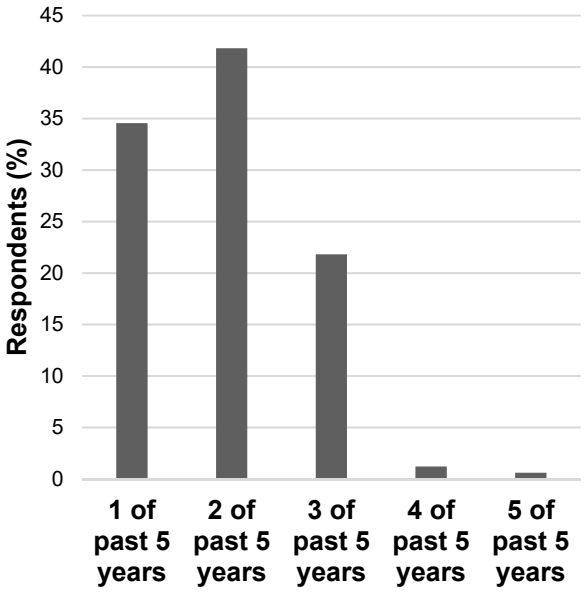

Figure 15. Northarvest number of years dry beans are grown in dry bean crop rotation program.

Insect Pests and Insecticide Use

Table 30. Worst insect problem in dry beans in 2021.

Insect[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
Leafhoppers	27	40.3	15,489	44.2
Grasshoppers	16	23.9	7,171	20.5
Aphids	6	9	4,597	13.1
Spider mites	9	13.4	3,867	11
None	8	11.9	3,645	10.4
Cutworms	1	1.5	280	0.8
Total	**67**	**100**	**35,049**	**100**
North Dakota				
Grasshoppers	50	50.5	33,065	44.6
None	29	29.3	20,819	28.1
Spider mites	7	7.1	7,470	10.1
Cutworms	3	3	5,116	6.9
Leafhoppers	4	4	3,096	4.2
Wireworms	3	3	3,044	4.1
Armyworms	1	1	1,000	1.3
Bean leaf beetle	1	1	473	0.6
Aphids	1	1	54	0.1
Total	**99**	**100**	**74,137**	**100**
Northarvest				
Grasshoppers	66	39.8	40,236	36.9
None	37	22.3	24,464	22.4
Leafhoppers	31	18.7	18,585	17
Spider mites	16	9.6	11,337	10.4
Cutworms	4	2.4	5,396	4.9
Aphids	7	4.2	4,651	4.3
Wireworms	3	1.8	3,044	2.8
Armyworms	1	0.6	1,000	0.9
Bean leaf beetle	1	0.6	473	0.4
Total	**166**	**100**	**109,186**	**100**

[a]Ranked as No. 1 insect problem by respondents.
[b]Respondents' acres only.
[c]Insect problem may not have been present across all reported acres.

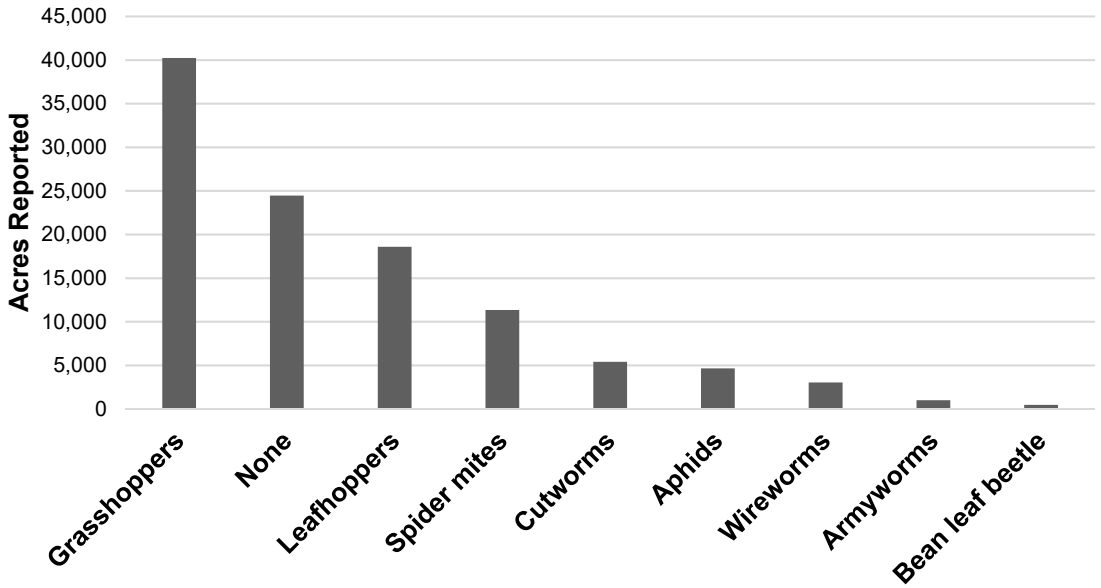

Figure 16. Northarvest worst insect problem in dry beans in 2021.

Table 31. Insects ranked as one of the three worst in dry beans in 2021.

Insect[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
Leafhoppers	43	64.2	23,909	68.2
Grasshoppers	31	46.3	14,501	41.4
Spider mites	22	32.8	10,560	30.1
Aphids	17	25.4	9,672	27.6
None	8	11.9	3,645	10.4
Bean leaf beetle	5	7.5	3,400	9.7
Cutworms	4	6	2,096	6
Wireworms	2	3	1,350	3.9
Foliage caterpillars	4	6	1,325	3.8
Armyworms	3	4.5	1,322	3.8
Seed corn maggot	2	3	1,250	3.6
North Dakota				
Grasshoppers	61	61.6	41,177	55.5
None	29	29.3	20,819	28.1
Leafhoppers	24	24.2	17,777	24
Spider mites	17	17.2	14,283	19.3
Cutworms	10	10.1	9,135	12.3
Wireworms	7	7.1	7,840	10.6
Seed corn maggot	4	4	4,762	6.4
Aphids	6	6.1	4,572	6.2
Armyworms	3	3	2,325	3.1
Bean leaf beetle	3	3	1,676	2.3
Foliage caterpillars	3	3	1,297	1.7
Northarvest				
Grasshoppers	92	55.4	55,678	51
Leafhoppers	67	40.4	41,686	38.2
Spider mites	39	23.5	24,843	22.8
None	37	22.3	24,464	22.4
Aphids	23	13.9	14,244	13
Cutworms	14	8.4	11,231	10.3
Wireworms	9	5.4	9,190	8.4
Seed corn maggot	6	3.6	6,012	5.5
Bean leaf beetle	8	4.8	5,076	4.6
Armyworms	6	3.6	3,647	3.3
Foliage caterpillars	7	4.2	2,622	2.4

[a]Ranked as No. 1, 2 or 3 insect problem by respondents.
[b]Respondents' acres only.
[c]Insect problem may not have been present across all reported acres.

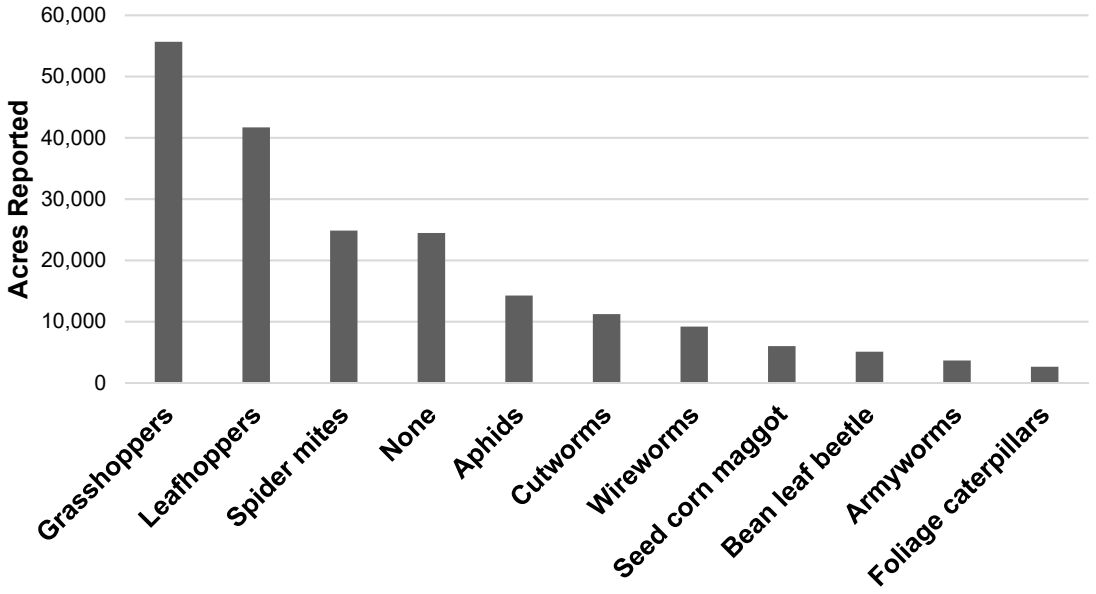

Figure 17. Northarvest insects ranked as one of the three worst in dry beans in 2021.

Table 32. Foliar insecticide use in dry beans in 2021.

Insecticide	Respondents (no.)	Respondents (%)	Acres reported (no.)[a,b]	Acres reported (%)[a,b]
Minnesota				
None	33	48.5	13,657	38
Tombstone	14	20.6	9,585	26.7
Lorsban	3	4.4	4,750	13.2
Asana XL	10	14.7	4,190	11.7
Brigade/generics	7	10.3	2,825	7.9
Warrior/generics	**3**	4.4	2,340	6.5
Hero	1	1.5	2,016	5.6
Mustang Maxx	1	1.5	950	2.6
Dimethoate	1	1.5	930	2.6
Baythroid XL	1	1.5	350	1
Insecticide Total			**27,936**	
North Dakota				
None	97	93.3	72,841	93.2
Tombstone	6	5.8	4,104	5.2
Warrior/generics	2	1.9	540	0.7
Mustang Maxx	1	1	400	0.5
Baythroid XL	1	1	229	0.3
Brigade/generics	2	1.9	70	0.1
Insecticide Total			**5,343**	
Northarvest				
None	130	75.6	86,498	75.8
Tombstone	20	11.6	13,689	12
Lorsban	3	1.7	4,750	4.2
Asana XL	10	5.8	4,190	3.7
Brigade/generics	9	5.2	2,895	2.5
Warrior/generics	5	2.9	2,880	2.5
Hero	1	0.6	2,016	1.8
Mustang Maxx	2	1.2	1,350	1.2
Dimethoate	1	0.6	930	0.8
Baythroid XL	2	1.2	579	0.5
Insecticide Total			**33,279**	

[a]Respondents' acres only. Multiple applications count as multiple acres.
[b]Percentages do not total 100% because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.
[c]Lorsban and other chlorpyrifos 4E products were labeled for preplant applications only.

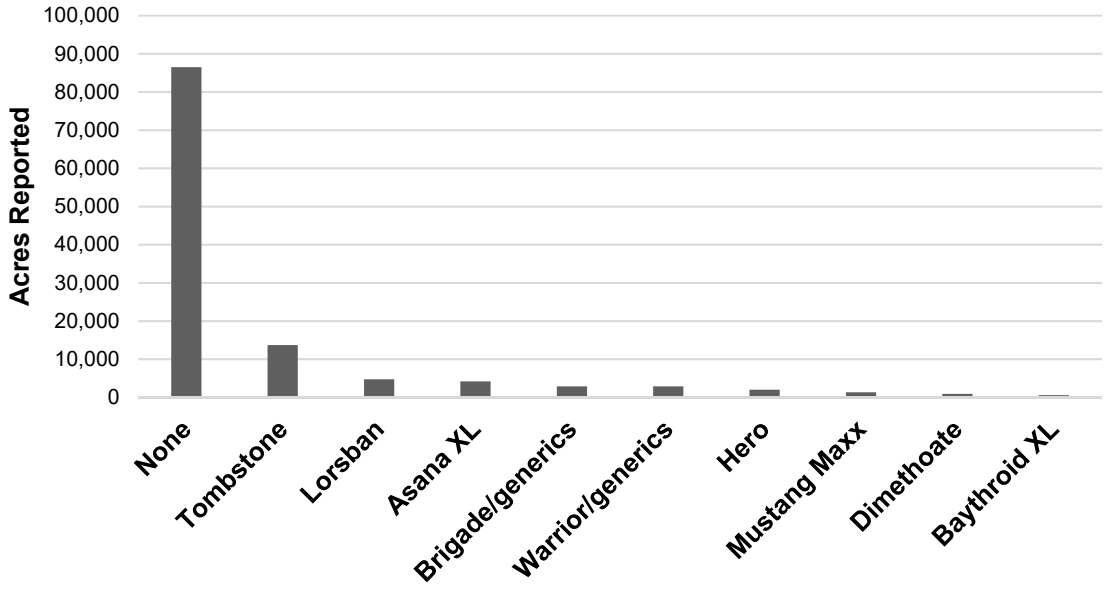

Figure 18. Northarvest foliar insecticide use in dry beans in 2021.

Table 33. Seed treatment and soil insecticide use in dry beans in 2021.

Seed Treatment	Respondents (no.)	Respondents (%)	Acres reported (no.)[a,b]	Acres reported (%)[a,b]
Minnesota				
Cruiser Maxx	38	53.5	22,218	59.9
Don't know	11	15.5	5,649	15.2
Cruiser 5FS	8	11.3	5,631	15.2
None	11	15.5	4,415	11.9
Cruiser Maxx Vibrance	9	12.7	3,236	8.7
Lorsban	3	4.2	1,555	4.2
Capture LFR[c]	1	1.4	1,500	4
Dyna-Shield Imidacloprid	3	4.2	1,336	3.6
Gaucho 600	1	1.4	170	0.5
Insecticide Total			**41,295**	
North Dakota				
Cruiser Maxx	35	33	31,029	39.8
None	35	33	16,778	21.5
Don't know	20	18.9	15,748	20.2
Capture LFR[c]	8	7.5	10,070	12.9
Lorsban	5	4.7	4,532	5.8
Cruiser 5FS	3	2.8	4,145	5.3
Cruiser Maxx Vibrance	6	5.7	3,313	4.3
Gaucho 600	2	1.9	1,682	2.2
Dyna-Shield Imidacloprid	1	0.9	1,616	2.1
Enhance AW	1	0.9	280	0.4
Insecticide Total			**72,415**	
Northarvest				
Cruiser Maxx	73	41.2	53,247	46.3
Don't know	31	17.5	21,397	18.6
None	46	26	21,193	18.4
Capture LFR[c]	9	5.1	11,570	10.1
Cruiser 5FS	11	6.2	9,776	8.5
Cruiser Maxx Vibrance	15	8.5	6,549	5.7
Lorsban	8	4.5	6,087	5.3
Dyna-Shield Imidacloprid	4	2.3	2,952	2.6
Gaucho 600	3	1.7	1,852	1.6
Enhance AW	1	0.6	280	0.2
Insecticide Total			**113,710**	

[a]Respondents' acres only.
[b]Percentages do not total 100% because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.
[c]Soil-applied insecticide.

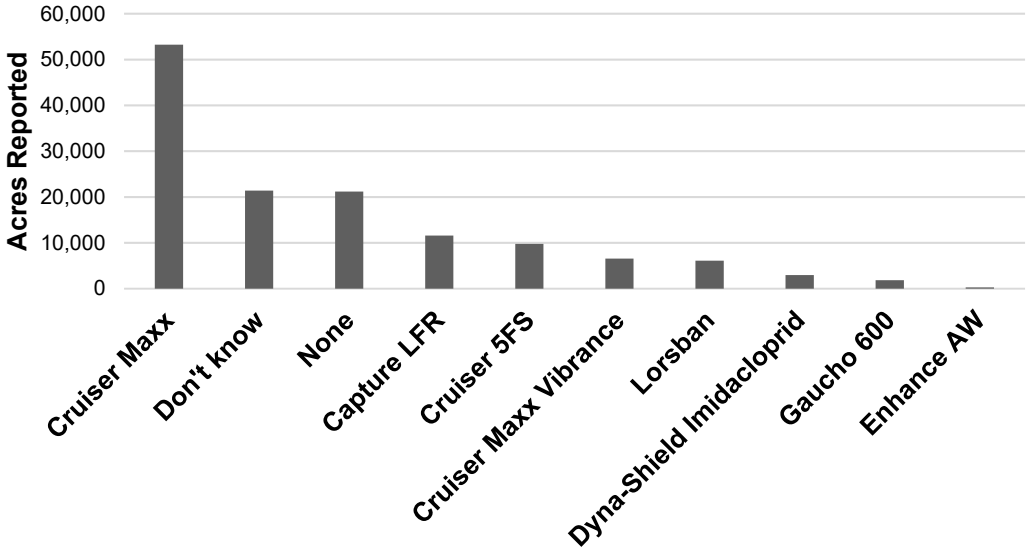

Figure 19. Northarvest insecticide seed treatment and soil insecticide use in dry beans in 2021.

Table 34. Worst disease problem in dry beans in 2021.

Disease[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
White mold	34	49.3	17,722	50
None	14	20.3	5,305	15
Root rot	6	8.7	5,116	14.4
Common bacterial blight	10	14.5	3,339	9.4
Bacterial brown spot	4	5.8	2,190	6.2
Anthracnose	1	1.4	1,753	4.9
Total	**69**	**100**	**35,425**	**100**
North Dakota				
None	52	50	30,310	40.4
White mold	21	20.2	20,329	27.1
Common bacterial blight	13	12.5	8,697	11.6
Root rot	7	6.7	7,949	10.6
Anthracnose	4	3.8	2,868	3.8
Bacterial wilt	4	3.8	2,266	3
Other viruses	1	1	1,055	1.4
Rust	1	1	925	1.2
Bacterial brown spot	1	1	700	0.9
Total	**104**	**100**	**75,099**	**100**
Northarvest				
White mold	55	31.8	38,051	34.4
None	66	38.2	35,615	32.2
Root rot	13	7.5	13,065	11.8
Common bacterial blight	23	13.3	12,036	10.9
Anthracnose	5	2.9	4,621	4.2
Bacterial brown spot	5	2.9	2,890	2.6
Bacterial wilt	4	2.3	2,266	2.1
Other viruses	1	0.6	1,055	1
Rust	1	0.6	925	0.8
Total	**173**	**100**	**110,524**	**100**

[a]Ranked as No. 1 disease problem by respondents.
[b]Respondents' acres only.
[c]Disease problem may not have been present across all reported acres.

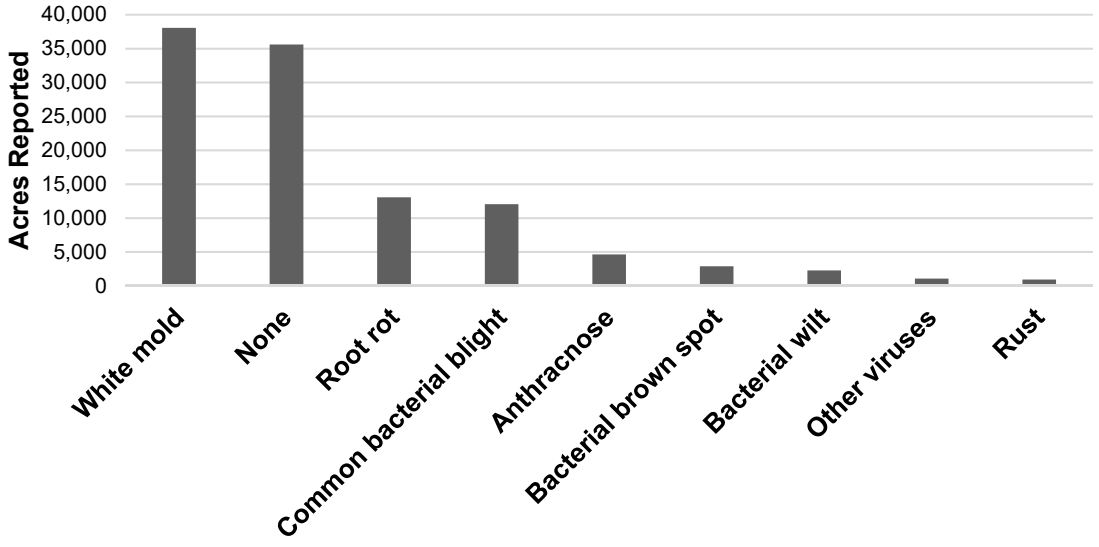

Figure 20. Northarvest worst disease problem in dry beans in 2021.

Table 35. Diseases ranked as one of the three worst in dry beans in 2021.

Disease[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
White mold	43	62.3	24,541	69.3
Common bacterial blight	34	49.3	19,616	55.4
Root rot	20	29	12,396	35
Halo blight	9	13	7,272	20.5
None	14	20.3	5,305	15
Anthracnose	7	10.1	4,258	12
Bacterial brown spot	8	11.6	3,757	10.6
Rust	4	5.8	2,765	7.8
Other viruses	3	4.3	2,590	7.3
Bacterial wilt	5	7.2	1,867	5.3
Bean common mosaic virus	1	1.4	150	0.4
North Dakota				
None	52	50	30,310	40.4
White mold	28	26.9	25,311	33.7
Common bacterial blight	28	26.9	21,583	28.7
Root rot	15	14.4	14,755	19.6
Anthracnose	8	7.7	6,489	8.6
Rust	7	6.7	5,852	7.8
Bacterial brown spot	6	5.8	5,179	6.9
Other viruses	6	5.8	5,008	6.7
Bacterial wilt	7	6.7	4,161	5.5
Halo blight	2	1.9	2,180	2.9
Northarvest				
White mold	71	41	49,852	45.1
Common bacterial blight	62	35.8	41,199	37.3
None	66	38.2	35,615	32.2
Root rot	35	20.2	27,151	24.6
Anthracnose	15	8.7	10,747	9.7
Halo blight	11	6.4	9,452	8.6
Bacterial brown spot	14	8.1	8,936	8.1
Rust	11	6.4	8,617	7.8
Other viruses	9	5.2	7,598	6.9
Bacterial wilt	12	6.9	6,028	5.5
Bean common mosaic virus	1	0.6	150	0.1

[a]Ranked as No. 1, 2 or 3 disease problem by respondents.
[b]Respondents' acres only.
[c]Disease problem may not have been present across all reported acres.

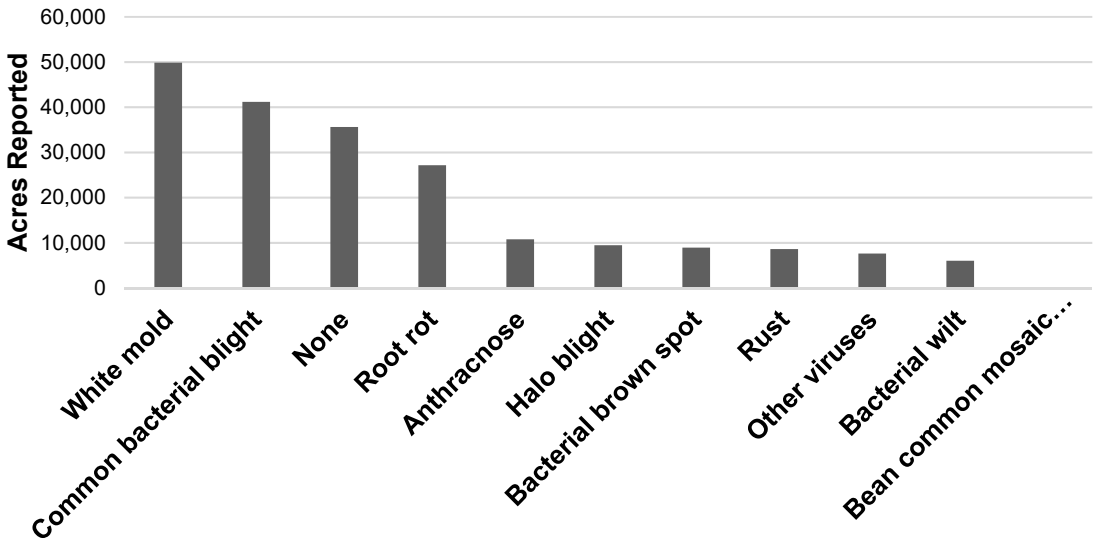

Figure 21. Northarvest diseases ranked as one of the three worst in dry beans in 2021.

Table 36. Foliar fungicide use in dry beans in 2021.

Fungicide	Resp. (no.)	Resp. (%)[b]	Total acres treated (no.)[a]	Total acres treated (%)[a,b]	Acres treated by ground (no.)[a]	Acres treated by ground (%)[a]	Acres treated by air (no.)[a]	Acres treated by air (%)[a]
Minnesota								
Endura	36	50	25,390	68.1	24,293	36.3	1,097	1.6
Topsin	19	26.4	9,298	24.9	7,628	11.4	1,670	2.5
T-methyl	20	27.8	9,236	24.8	8,124	12.1	1,112	1.7
None	17	23.6	5,969	16	---	---	---	---
Incognito	2	2.8	3,730	10	3,730	5.6	0	0
Sanidate	1	1.4	3,400	9.1	3,400	5.1	0	0
ProPulse	2	2.8	2,952	7.9	2,952	4.4	0	0
Badge	5	6.9	2,886	7.7	2,516	3.8	370	0.6
Omega	3	4.2	2,732	7.3	2,732	4.1	0	0
Priaxor	3	4.2	1,345	3.6	1,345	2	0	0
Aframe	1	1.4	1,280	3.4	1,280	1.9	0	0
Monsoon	1	1.4	964	2.6	964	1.4	0	0
Calcium	1	1.4	964	2.6	964	1.4	0	0
Oxidate	2	2.8	802	2.2	150	0.2	652	1
Headline	1	1.4	600	1.6	600	0.9	0	0
Cercobin	1	1.4	370	1	370	0.6	0	0
Delaro	1	1.4	355	1	355	0.5	0	0
Champ	1	1.4	312	0.8	312	0.5	0	0
Proline	1	1.4	300	0.8	300	0.4	0	0
Fungicide Total			**66,916**		**62,015**	**92.7**	**4,901**	**7.3**
North Dakota								
None	88	81.5	59,197	74.7	---	---	---	---
Topsin	12	11.1	6,715	8.5	5,215	20.1	1,500	5.8
Endura	12	11.1	5,536	7	5,086	19.6	450	1.7
T-methyl	9	8.3	4,827	6.1	4,505	17.4	322	1.2
Priaxor	7	6.5	4,419	5.6	3,669	14.1	750	2.9
Incognito	2	1.9	800	1	800	3.1	0	0
Badge	2	1.9	623	0.8	623	2.4	0	0
Monsoon	1	0.9	600	0.8	600	2.3	0	0
Praiz	1	0.9	530	0.7	530	2	0	0
Tebuzol	1	0.9	500	0.6	500	1.9	0	0
Aproach	2	1.9	409	0.5	409	1.6	0	0
Evito	1	0.9	400	0.5	400	1.5	0	0
Headline	1	0.9	400	0.5	400	1.5	0	0
Onset	1	0.9	100	0.1	100	0.4	0	0
Champ	1	0.9	73	0.1	73	0.3	0	0
Fungicide Total			**25,932**		**22,910**	**88.3**	**3,022**	**11.7**
Northarvest								
None	105	58.3	65,166	55.9	---	---	---	---
Endura	48	26.7	30,926	26.5	29,379	31.6	1,547	1.7
Topsin	31	17.2	16,013	13.7	12,843	13.8	3,170	3.4
T-methyl	29	16.1	14,063	12.1	12,629	13.6	1,434	1.5
Priaxor	10	5.6	5,764	4.9	5,014	5.4	750	0.8
Incognito	4	2.2	4,530	3.9	4,530	4.9	0	0
Badge	7	3.9	3,509	3	3,139	3.4	370	0.4
Sanidate	1	0.6	3,400	2.9	3,400	3.7	0	0
ProPulse	2	1.1	2,952	2.5	2,952	3.2	0	0
Omega	3	1.7	2,732	2.3	2,732	2.9	0	0
Monsoon	2	1.1	1,564	1.3	1,564	1.7	0	0
Aframe	1	0.6	1,280	1.1	1,280	1.4	0	0
Headline	2	1.1	1,000	0.9	1,000	1.1	0	0
Calcium	1	0.6	964	0.8	964	1	0	0
Oxidate	2	1.1	802	0.7	150	0.2	652	0.7
Praiz	1	0.6	530	0.5	530	0.6	0	0
Tebuzol	1	0.6	500	0.4	500	0.5	0	0
Aproach	2	1.1	409	0.4	409	0.4	0	0
Evito	1	0.6	400	0.3	400	0.4	0	0
Champ	2	1.1	385	0.3	385	0.4	0	0
Cercobin	1	0.6	370	0.3	370	0.4	0	0
Delaro	1	0.6	355	0.3	355	0.4	0	0
Proline	1	0.6	300	0.3	300	0.3	0	0
Onset	1	0.6	100	0.1	100	0.1	0	0
Fungicide Total			**92,848**		**84,925**	**91.5**	**7,923**	**8.5**

[a]Respondents' acres only. Includes acreage treated more than once with the same product.
[b]Percentages do not total 100% because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.

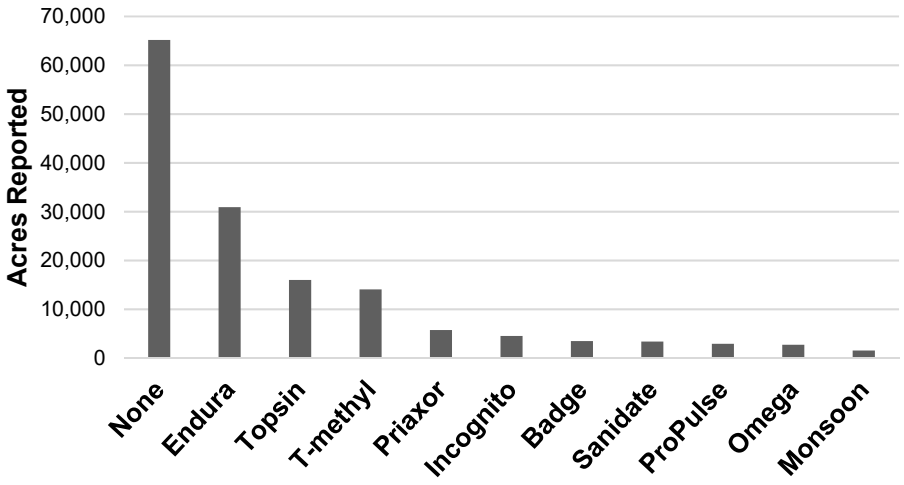

Figure 22. Northarvest foliar fungicide use in dry beans in 2021 (10 most frequently used products only).

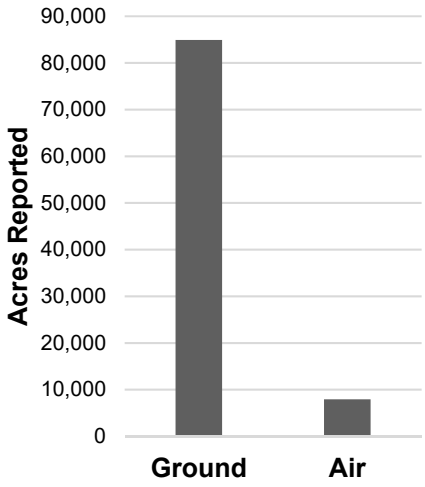

Figure 23. Northarvest fungicide application method in dry beans in 2021.

Table 37. In-furrow fungicide use in dry beans in 2021.

Fungicide	Respondents (no.)	Respondents (%)	Total acres treated (no.)[a]	Total acres treated (%)[a]
Minnesota				
None	63	87.5	30,444	81.6
Xanthion	5	6.9	4,965	13.3
AZteroid	2	2.8	1,104	3
Headline	1	1.4	800	2.1
Priaxor	1	1.4	600	1.6
Serenade	1	1.4	185	0.5
Fungicide Total			**7,654**	**20.5**
North Dakota				
None	109	99.1	77,764	99
AZteroid	1	0.9	791	1
Fungicide Total			**791**	**1**
Northarvest				
None	172	94.5	108,208	93.4
Xanthion	5	2.7	4,965	4.3
AZteroid	3	1.6	1,895	1.6
Headline	1	0.5	800	0.7
Priaxor	1	0.5	600	0.5
Serenade	1	0.5	185	0.2
Fungicide Total			**8,445**	**7.3**

[a]Respondents' acres only.

Table 38. Fungicide seed treatment use in dry beans in 2021.

Seed treatment	Respondents (no.)	Respondents (%)[b]	Total acres treated (no.)[a]	Total acres treated (%)[a,b]
Minnesota				
Cruiser Maxx	38	55.1	22,218	60.6
Apron Maxx	12	17.4	9,196	25.1
Maxim	10	14.5	7,474	20.4
Apron, Apron XL	11	15.9	5,660	15.4
Vibrance	7	10.1	4,785	13.1
None	10	14.5	4,692	12.8
Rancona	7	10.1	4,183	11.4
Don't know	2	2.9	3,900	10.6
Cruiser Maxx Vibrance	9	13	3,236	8.8
Heads Up	6	8.7	2,938	8
Captan	3	4.3	2,800	7.6
Vibrance Maxx	3	4.3	2,781	7.6
Rancona Summit	1	1.4	2,016	5.5
Stamina	1	1.4	800	2.2
Belmont	1	1.4	380	1
Dynasty	1	1.4	380	1
Seed Treatment Total			**72,747**	
North Dakota				
Cruiser Maxx	35	33.3	31,029	41.1
None	30	28.6	15,614	20.7
Apron, Apron XL	12	11.4	8,578	11.4
Vibrance Maxx	9	8.6	7,430	9.8
Apron Maxx	13	12.4	7,248	9.6
Heads Up	5	4.8	6,163	8.2
Maxim	10	9.5	5,915	7.8
Rancona	10	9.5	5,812	7.7
Don't know	9	8.6	5,569	7.4
Vibrance	9	8.6	4,816	6.4
Dynasty	5	4.8	4,347	5.8
Cruiser Maxx Vibrance	6	5.7	3,313	4.4
Captan	2	1.9	1,800	2.4
Stamina	1	1	791	1
Obvius Plus	1	1	380	0.5
Rancona Summit	1	1	47	0.1
Seed Treatment Total			**93,238**	
Northarvest				
Cruiser Maxx	73	42	53,247	47.5
None	40	23	20,306	18.1
Apron Maxx	25	14.4	16,444	14.7
Apron, Apron XL	23	13.2	14,238	12.7
Maxim	20	11.5	13389	11.9
Vibrance Maxx	12	6.9	10,211	9.1
Rancona	17	9.8	9,995	8.9
Vibrance	16	9.2	9,601	8.6
Don't know	11	6.3	9,469	8.4
Heads Up	11	6.3	9,101	8.1
Cruiser Maxx Vibrance	15	8.6	6,549	5.8
Dynasty	6	3.4	4,727	4.2
Captan	5	2.9	4,600	4.1
Rancona Summit	2	1.1	2,063	1.8
Stamina	2	1.1	1,591	1.4
Belmont	1	0.6	380	0.3
Obvius Plus	1	0.6	380	0.3
Seed Treatment Total			**165,985**	

[a]Respondents' acres only. Includes acreage treated with more than one product.
[b]Percentages do not total 100% because some respondents treated the same acreage with more than one product.

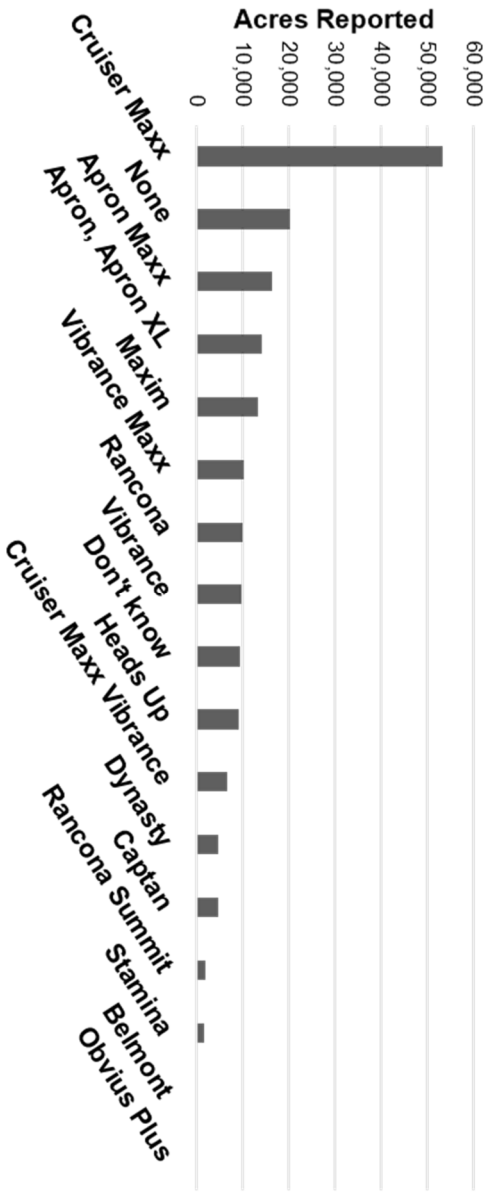

Figure 24. Northarvest fungicide seed treatment use in dry beans in 2021.

Table 39. Worst weed problem in dry beans in 2021.

Weed[a]	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
Lambsquarters	20	28.2	8,742	24.4
Waterhemp	27	38	8,295	23.2
Ragweed	10	14.1	5,950	16.6
Redroot pigweed	5	7	5,913	16.5
Prostrate pigweed	2	2.8	2,326	6.5
Kochia	2	2.8	1,604	4.5
Volunteer grain	1	1.4	1,300	3.6
Nightshade	2	2.8	735	2.1
Wild buckwheat	1	1.4	450	1.3
Biennial wormwood	1	1.4	442	1.2
Total	**71**	**100**	**35,757**	**100**
North Dakota				
Kochia	44	38.6	37,791	45.3
Lambsquarters	19	16.7	13,299	15.9
Ragweed	16	14	12,740	15.3
Waterhemp	5	4.4	3,377	4
Foxtail	3	2.6	3,030	3.6
Redroot pigweed	9	7.9	2,613	3.1
Cocklebur	2	1.8	2,523	3
Wild buckwheat	4	3.5	2,394	2.9
Lanceleaf sage	1	0.9	1,800	2.2
Volunteer grain	3	2.6	1,045	1.3
Horseweed	1	0.9	780	0.9
Biennial wormwood	2	1.8	670	0.8
Nightshade	2	1.8	460	0.6
Wild oats	1	0.9	420	0.5
None	1	0.9	400	0.5
Quackgrass	1	0.9	95	0.1
Total	**114**	**100**	**83,437**	**100**
Northarvest				
Kochia	46	24.9	39,395	33.1
Lambsquarters	39	21.1	22,041	18.5
Ragweed	26	14.1	18,690	15.7
Waterhemp	32	17.3	11,672	9.8
Redroot pigweed	14	7.6	8,526	7.2
Foxtail	3	1.6	3,030	2.5
Wild buckwheat	5	2.7	2,844	2.4
Cocklebur	2	1.1	2,523	2.1
Volunteer grain	4	2.2	2,345	2
Prostrate pigweed	2	1.1	2,326	2
Lanceleaf sage	1	0.5	1,800	1.5
Nightshade	4	2.2	1,195	1
Biennial wormwood	3	1.6	1,112	0.9
Horseweed	1	0.5	780	0.7
Wild oats	1	0.5	420	0.4
None	1	0.5	400	0.3
Quackgrass	1	0.5	95	0.1
Total	**185**	**100**	**119,194**	**100**

[a]Ranked as No. 1 weed problem by respondents.
[b]Respondents' acres only.
[c]Weed problem may not have been present across all reported acres.

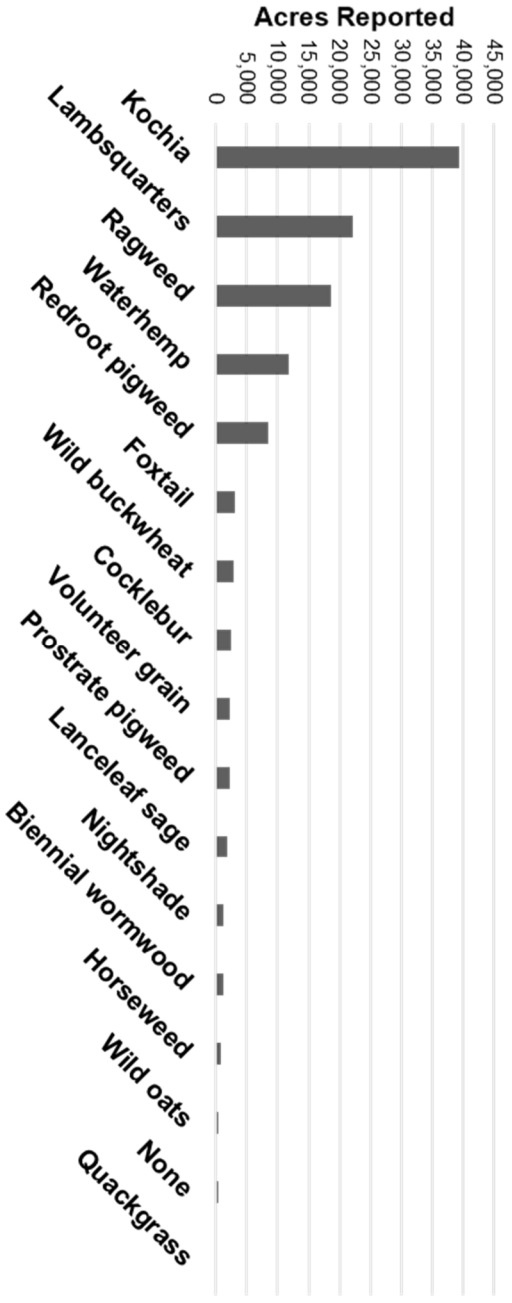

Figure 25. Northarvest worst weed problem in dry beans in 2021.

Table 40. Weeds ranked as one of the three worst in dry beans in 2021.

Weed[a]	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[b]	Acres reported (%)[b]
Minnesota				
Lambsquarters	54	76.1	26,249	73.4
Ragweed	34	47.9	19,399	54.3
Waterhemp	41	57.7	15,422	43.1
Red. pigweed	25	35.2	13,217	37
Nightshade	13	18.3	6,477	18.1
Cocklebur	5	7	3,965	11.1
Pro. pigweed	3	4.2	3,826	10.7
Kochia	6	8.5	3,614	10.1
Buckwheat	4	5.6	3,286	9.2
Vol. grain	4	5.6	3,233	9
Canada thistle	7	9.9	1,797	5
Foxtail	2	2.8	1,505	4.2
Vol. canola	1	1.4	511	1.4
Nutsedge	2	2.8	479	1.3
Quackgrass	1	1.4	450	1.3
Wild oats	1	1.4	450	1.3
Bi. wormwood	1	1.4	442	1.2
Proso millet	1	1.4	405	1.1
Smartweed	1	1.4	310	0.9
Wild mustard	1	1.4	300	0.8
North Dakota				
Kochia	66	57.9	54,500	65.3
Lambsquarters	46	40.4	32,828	39.3
Ragweed	32	28.1	26,416	31.7
Red. pigweed	37	32.5	26,063	31.2
Vol. grain	24	21.1	19,631	23.5
Bi. wormwood	16	14	11,736	14.1
Cocklebur	11	9.6	8,675	10.4
Waterhemp	12	10.5	8,640	10.4
Wild oats	10	8.8	8,338	10
Foxtail	12	10.5	8,118	9.7
Canada thistle	9	7.9	6,324	7.6
Horseweed	10	8.8	5,770	6.9
Buckwheat	9	7.9	5,274	6.3
Wild mustard	5	4.4	3,520	4.2
Downy brome	1	0.9	3,350	4
Nightshade	6	5.3	3,237	3.9
Lance. sage	2	1.8	2,700	3.2
Venice mallow	2	1.8	1,541	1.8
Vol. canola	5	4.4	1,464	1.8
Sunflower	1	0.9	1,259	1.5
Hawksbeard	1	0.9	600	0.7
Black medic	1	0.9	550	0.7
Pro. pigweed	1	0.9	530	0.6
None	1	0.9	400	0.5
Quackgrass	1	0.9	95	0.1
Clover	1	0.9	40	0

Weed[a]	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[b]	Acres reported (%)[b]
Northarvest				
Lambsquarters	100	54.1	59,077	49.6
Kochia	72	38.9	58,114	48.8
Ragweed	66	35.7	45,815	38.4
Red. pigweed	62	33.5	39,280	33
Waterhemp	53	28.6	24,062	20.2
Vol. grain	28	15.1	22,864	19.2
Cocklebur	16	8.6	12,640	10.6
Bi. wormwood	17	9.2	12,178	10.2
Nightshade	19	10.3	9,714	8.1
Foxtail	14	7.6	9,623	8.1
Wild oats	11	5.9	8,788	7.4
Buckwheat	13	7	8,560	7.2
Canada thistle	16	8.6	8,121	6.8
Horseweed	10	5.4	5,770	4.8
Pro. pigweed	4	2.2	4,356	3.7
Wild mustard	6	3.2	3,820	3.2
Downy brome	1	0.5	3,350	2.8
Lance. sage	2	1.1	2,700	2.3
Vol. canola	6	3.2	1,975	1.7
Venice mallow	2	1.1	1,541	1.3
Sunflower	1	0.5	1,259	1.1
Hawksbeard	1	0.5	600	0.5
Black medic	1	0.5	550	0.5
Quackgrass	2	1.1	545	0.5
Nutsedge	2	1.1	479	0.4
Proso millet	1	0.5	405	0.3
None	1	0.5	400	0.3
Smartweed	1	0.5	310	0.3
Clover	1	0.5	40	0

[a]Ranked as No. 1, 2 or 3 weed by respondents.
[b]Respondents' acres only.
[c]Weed problem may not have been present across all reported acres.

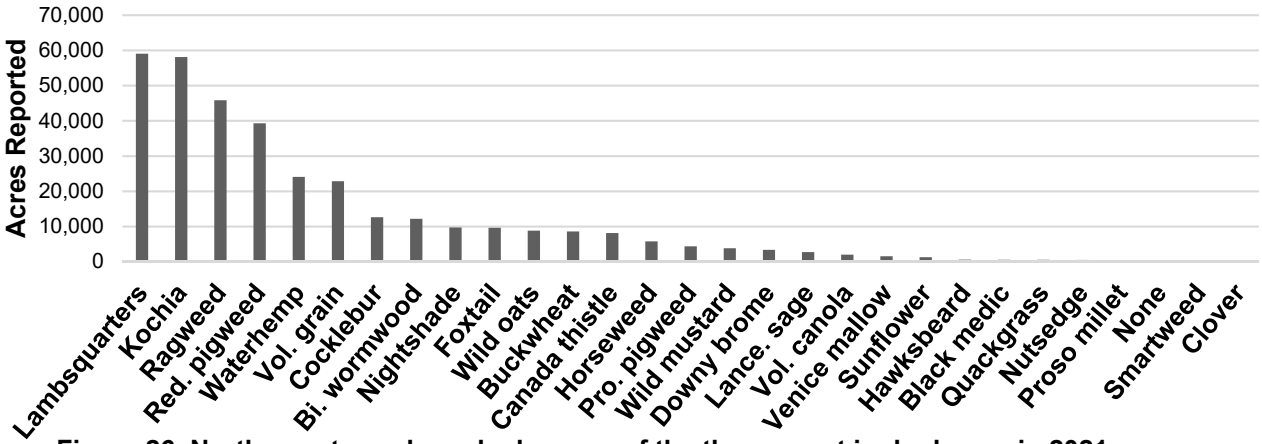

Figure 26. Northarvest weeds ranked as one of the three worst in dry beans in 2021.

Table 41. Weed control practices used in dry beans in 2021.

Herbicide or other practice	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[a]	Acres reported (%)[b]
Minnesota				
Basagran/generics	41	56.2	25,788	68.8
Raptor	33	45.2	22,150	59.1
Select/generics	27	37	17,778	47.4
Reflex	39	53.4	16,542	44.1
Outlook	19	26	11,681	31.2
Varisto	25	34.2	10,963	29.2
Prowl	21	28.8	10,027	26.7
Dual/generics	19	26	9,940	26.5
Sonalan	20	27.4	9,642	25.7
Eptam	14	19.2	7,811	20.8
Permit	14	19.2	6,776	18.1
NDSU micro-rate	6	8.2	3,402	9.1
Trifluralin	10	13.7	3,343	8.9
Glyphosate pre-plant	4	5.5	2,357	6.3
Assure	5	6.8	2,318	6.2
Spartan/Charge	6	8.2	1,857	5
Poast	2	2.7	1,413	3.8
Fusilade DX	3	4.1	830	2.2
BroadAxe	1	1.4	290	0.8
Spartan Elite	1	1.4	290	0.8
Pursuit	1	1.4	88	0.2
Herbicide Total			**165,286**	
Cultivation	19	26	15,249	40.7
Cover crop	12	16.4	7,931	21.2
Manual labor	7	9.6	2,454	6.5
Non-herbicide Total			**25,634**	
Weed Control Total			**190,920**	
Basagran/generics	88	77.2	76,786	91
Reflex	67	58.8	57,831	68.6
Select/generics	55	48.2	44,968	53.3
Raptor	50	43.9	37,164	44.1
Varisto	35	30.7	28,904	34.3
Spartan/Charge	42	36.8	28,337	33.6
Glyphosate pre-plant	33	28.9	25,168	29.8
Sonalan	31	27.2	17,763	21.1
BroadAxe	17	14.9	14,639	17.4
Dual/generics	9	7.9	13,765	16.3
Outlook	15	13.2	8,622	10.2
Permit	11	9.6	8,025	9.5
Trifluralin	9	7.9	7,584	9
Assure	7	6.1	6,825	8.1
Prowl	8	7	4,158	4.9
NDSU micro-rate	5	4.4	3,940	4.7
Pursuit	8	7	3,932	4.7
Poast	4	3.5	2,467	2.9
Glyph. post-harvest	4	3.5	2,243	2.7
Eptam	2	1.8	1,500	1.8
Fusilade DX	1	0.9	1,055	1.3
Spartan Elite	1	0.9	275	0.3
Herbicide Total			**395,951**	
Cultivation	15	13.2	10,253	12.2
Cover crop	10	8.8	8,114	9.6
Rotary hoe	2	1.8	627	0.7
Manual labor	2	1.8	275	0.3
Non-herbicide Total			**19,269**	
Weed Control Total			**415,220**	

Herbicide or other practice	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[a]	Acres reported (%)[b]
Northarvest				
Basagran/generics	129	69	102,574	84.2
Reflex	106	56.7	74,373	61
Select/generics	82	43.9	62,746	51.5
Raptor	83	44.4	59,314	48.7
Varisto	60	32.1	39,867	32.7
Spartan/Charge	48	25.7	30,194	24.8
Glyphosate pre-plant	37	19.8	27,525	22.6
Sonalan	51	27.3	27,405	22.5
Dual/generics	28	15	23,705	19.5
Outlook	34	18.2	20,303	16.7
BroadAxe	18	9.6	14,929	12.3
Permit	25	13.4	14,801	12.1
Prowl	29	15.5	14,185	11.6
Trifluralin	19	10.2	10,927	9
Eptam	16	8.6	9,311	7.6
Assure	12	6.4	9,143	7.5
NDSU micro-rate	11	5.9	7,342	6
Pursuit	9	4.8	4,020	3.3
Poast	6	3.2	3,880	3.2
Glyph. post-harvest	4	2.1	2,243	1.8
Fusilade DX	4	2.1	1,885	1.5
Spartan Elite	2	1.1	565	0.5
Herbicide Total			**561,237**	
Cultivation	34	18.2	25,502	20.9
Cover crop	22	11.8	16,045	13.2
Manual labor	9	4.8	2,729	2.2
Rotary hoe	2	1.1	627	0.5
Non-herbicide Total			**44,903**	
Weed Control Total			**606,140**	

[a]Respondents' acres only. Includes acreage treated more than once with the same product.
[b]Percentages do not total 100% because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.
[c]NDSU micro-rate is a reduced-rate tank mix of Basagran, Raptor, Reflex and Select.

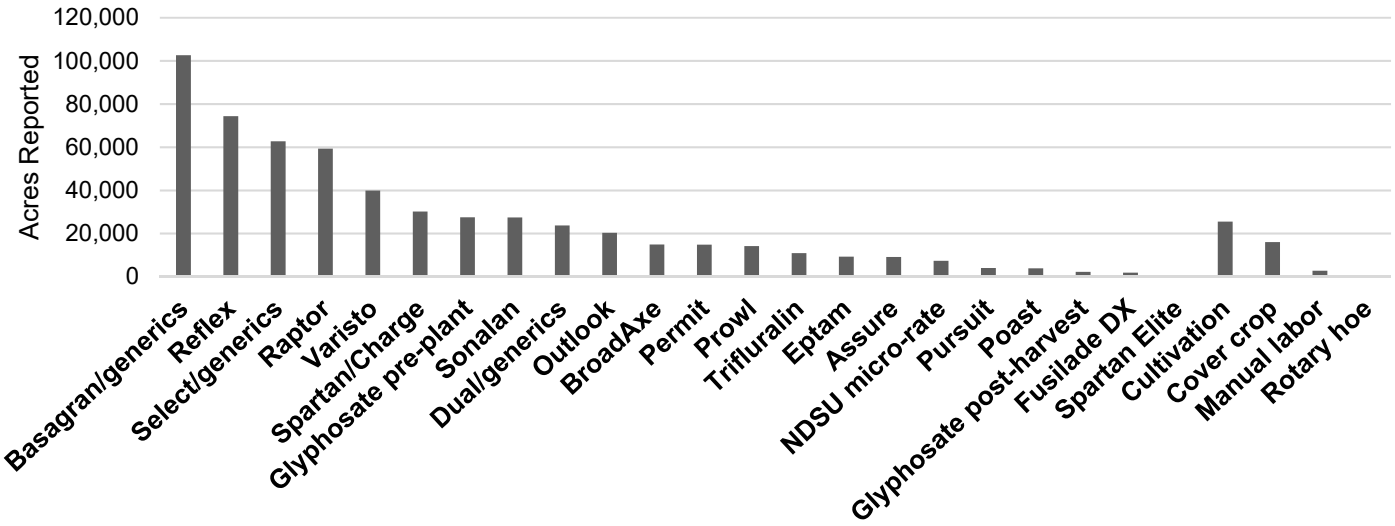

Figure 27. Northarvest weed control practices used in dry beans in 2021.

Scouting and Threshold Practices

Table 42. Scouting practices in dry beans in 2021.

	Insects		Diseases		Weeds	
Minnesota	**Respon-dents (no.)**	**Respon-dents (%)**	**Respon-dents (no.)**	**Respon-dents (%)**	**Respon-dents (no.)**	**Respon-dents (%)**
Crop consultant	31	41.9	29	39.2	19	26
Grower	30	40.5	31	41.9	39	53.4
Both	12	16.2	14	18.9	15	20.5
Don't scout	1	1.4	0	0	0	0
Total	**74**	**100**	**74**	**100**	**73**	**100**
North Dakota						
Crop consultant	55	48.7	60	53.1	53	46.9
Grower	50	44.2	44	38.9	49	43.4
Both	6	5.3	8	7.1	10	8.8
Don't scout	2	1.8	1	0.9	1	0.9
Total	**113**	**100**	**113**	**100**	**113**	**100**
Northarvest						
Crop consultant	86	46	89	47.6	72	38.7
Grower	80	42.8	75	40.1	88	47.3
Both	18	9.6	22	11.8	25	13.4
Don't scout	3	1.6	1	0.5	1	0.5
Total	**187**	**100**	**187**	**100**	**186**	**100**

Table 43. Use of economic thresholds for insects in dry beans in 2021.

	Respondents (no.)	Respondents (%)
Minnesota		
Economic thresholds used	72	97.3
Economic thresholds not used	2	2.7
Total	**74**	**100**
North Dakota		
Economic thresholds used	104	95.4
Economic thresholds not used	5	4.6
Total	**109**	**100**
Northarvest		
Economic thresholds used	176	96.2
Economic thresholds not used	7	3.8
Total	**183**	**100**

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Appendix I.

PLEASE COMPLETE ALL REQUESTED INFORMATION IN THE FOLLOWING TABLES FOR YOUR 2021 DRY BEAN CROP

Dry Bean Production in 2021		
State	**County**	**Acres**
Minnesota	1.	
	2.	
	3.	
North Dakota	1.	
	2.	
	3.	
Total dry bean acres planted		
Total dry bean acres harvested		
Total irrigated dry bean acres		
Total dry bean acres on tile-drained ground		

Dry Bean Classes, Varieties and Acres Grown in 2021		
Bean Class	**Variety**	**Acres**
Black	AAC Knight Rider	
	Ace	
	Adams	
	Black Bear	
	Blackbeard	
	Black Cat	
	Black Tails	
	Eclipse	
	ND Twilight	
	Spectre	
	Zenith	
	Zorro	
	Other black (please specify)	
Cranberry	AAC Scotty	
	Amaranto	
	Etna	
	Vero	
	Other cranberry (please specify)	
Great Northern	Aries	
	Draco	
	Eiger	
	ND Pegasus	
	Powderhorn	
	Taurus	
	Other GN (please specify)	
Kidney	Beluga	
	Big Red	
	Cabernet	
	California Early LRK (CELRK)	
	Chaparral	
	Clouseau	
	Dynasty	
	Epic	
	Foxfire	

Dry Bean Classes, Varieties and Acres Grown in 2021		
Bean Class	**Variety**	**Acres**
	Montcalm	
	ND Whitetail	
	Pink Panther	
	Rampart	
	Red Cedar	
	Red Dawn	
	Red Hawk	
	Red Rover	
	Ronnie's Red	
	Rosie	
	Spire	
	Talon	
	Other kidney (please specify)	
Navy	AAC Argosy	
	AAC Shock	
	AC Portage	
	Alpena	
	Apex	
	Armada	
	Blizzard	
	Ensign	
	Medalist	
	Nautica	
	Norstar	
	SV1893GH	
	T-9905	
	Valiant	
	Other navy (please specify)	
Pink	Floyd	
	Magnolia	
	Rosetta	
	Sedona	
	Other pink (please specify)	
Pinto	Buster	
	Cancun	
	Centennial	
	Charro	
	Cowboy	
	Croissant	
	DR Wood	
	Gleam (SD)*	
	Island	
	La Paz	
	Lariat	
	Long's Peak	
	Lumen (SD)*	
	Maverick	
	Monterrey	
	Mystic (SD)*	

Dry Bean Classes, Varieties and Acres Grown in 2021		
Bean Class	**Variety**	**Acres**
	ND 307	
	ND Falcon	
	ND Palomino (SD)*	
	Radiant (SD)*	
	Rough Rider	
	Santa Cruz	
	Sinaloa	
	Sonora	
	Stampede	
	StayBright (SD)*	
	Torreon	
	Vibrant (SD)*	
	White Mountain (SD)*	
	Windbreaker	
	Other pinto (please specify)	

Dry Bean Classes, Varieties and Acres Grown in 2021		
Bean Class	**Variety**	**Acres**
Small Red	Caldera	
	Cayenne	
	Merlot	
	Viper	
	Ruby	
	Other red (please specify)	
Other Class (please specify)	Other variety (please specify)	

***SD = Slow-darkening pinto variety. These varieties retain their light-brown color longer than non-SD varieties.**

Production Problems

For each production problem, please fill in acreage affected for each bean class you produced in 2021. Space is provided for up to three bean classes.			
	Bean Class:_____	**Bean Class:_____**	**Bean Class:_____**
Production Problem	**Acres Affected**	**Acres Affected**	**Acres Affected**
Herbicide drift injury *List herbicide(s)			
Applied herbicide injury *List herbicide(s)			
Herbicide carryover injury *List herbicide(s)			
Delayed planting			
Diseases			
Drought			
Percent yield loss due to drought	%	%	%
Emergence/stand			
Frost damage (indicate spring or fall)			
Hail damage			
Harvest			
Insects			
Micronutrient deficiency			
Seeding problems			
Soil salinity			
Water damage (beans harvested)			
Water damage (beans NOT harvested)			
Weeds			
Wind damage			
Other problems (please specify)			

Agronomy

Please list row spacing, seeding rate and established stand for each bean class you planted in 2021.			
Bean Class	**Row Spacing (inches)**	**Seeding Rate (seeds per acre)**	**Established Stand (plants per acre)**

Did the size of your purchased seed affect your ability to plant your intended dry bean acreage in 2021?		
Problem	**Variety(ies)**	**Number of Acres (short or long)**
Not enough seed		
Too much seed		
No problem		

Please list the crops in your dry bean crop rotation program for all fields you planted to dry bean in 2021.	
Year	**List of Crops**
2020	
2019	
2018	
2017	

Please list acreage for each tillage type listed below for your dry bean fields in 2021.			
Tillage Type	**Acreage**	**Tillage Type**	**Acreage**
Conventional		Strip-till	
Minimum		No-till	

Cover Crops in Dry Beans in 2021. Please answer the questions in the table below.
Did you use a cover crop on your dry bean ground in 2021? Yes No
If you used a cover crop, what plant species did you use?
Seasonally, when did you use the crop? (Circle all that apply) Prior to planting dry beans During dry bean production After dry bean harvest
What was the purpose(s) of the cover crop? (circle all that apply) Soil moisture conservation/management Reduce soil erosion Improve soil health Weed control Other _____

Did you use a ground roller on your dry bean ground in 2021?			
Timing	**Bean Class**	**Acres Rolled**	**Percent rolled acres direct combined**
Preplant			
Pre-emerge			
Post-emerge			
Didn't roll			

Please indicate pounds per acre for fertilizer components in dry beans in 2021 and answer the fertility questions .				
Nitrogen	**Phosphate**	**Potash**	**Zinc**	**Sulfur**
Did you inoculate with Rhizobium?			Yes	No
Did you soil test prior to fertilizer applications?			Yes	No
Did you use site-specific nutrient management for any fertilizers?			Yes	No

What fertilizer application methods did you use for dry beans in 2021? (Circle all that apply)			
Broadcast	Banded	In-furrow	Foliar

Harvest: Please circle answer for each question.
What percentage of your dry bean crop was harvested using direct combining in 2021? 0% 1-25% 26-50% 51-75% 76-100%
Your estimated yield loss using direct combining? 0% 1-5% 6-10% 11-15% 16-20% N/A
Your estimated yield loss using indirect harvest methods (knifing/undercutting, swathing, Pickett, etc.)? 0% 1-5% 6-10% 11-15% 16-20% N/A

Do you consider slow-darkening (SD) pintos a good alternative for pinto bean production in the region?		
Yes	**No**	**Don't know**
If more seed of SD pintos was available, would you grow more SD pintos compared with regular darkening pintos?		
Yes	**No**	**I don't grow pintos**
What do you think is the main limitation for increased SD pinto production in our area? (Circle all that apply)		
Market Price Seed Price Seed Availability Lack of markets Lack of grower knowledge about benefits of SD pintos Lack of industry knowledge about benefits of SD pintos Lack of consumer knowledge about benefits of SD pintos Poor agronomic or yield performance Other:		

Insecticides and Insect Pests

Foliar Insecticides Used on Dry Beans in 2021.
If you did not use a foliar insecticide, please write "0" for acres treated.

Foliar Insecticide (write in name or number from the list below)	Acres Treated	No. of Applications	Application Method (circle one for each application)	
			air	ground
			air	ground
			air	ground

Foliar Insecticide Products

1. Acephate/Orthene	8. Declare	15. Tombstone
2. Asana XL	9. Dimethoate	16. Transform
3. Baythroid XL	10. Hero	17. Voliam Xpress
4. Besiege	11. Lorsban/generics	18. Warrior/generics
5. Blackhawk	12. Mustang Maxx	19. None used
6. Brigade/generics	13. Sevin	20. Other (specify)
7. Coragen	14. Sivanto Prime	

Seed Treatment Insecticides Used on Dry Beans in 2021.
If you did not use a seed treatment insecticide, please write "0" for acres treated.

Seed Treatment Insecticide (write in name or number from the list below)	Acres Treated

Seed Treatment Insecticide Products

1. Attendant 600 FS	7. Gaucho 600
2. Capture LFR (in-furrow)	8. Lorsban
3. Cruiser 5FS	9. Don't know
4. Cruiser Maxx	10. None used
5. Dyna-Shield Imidacloprid 5	11. Other (specify)
6. Enhance AW	

Worst Insect/Mite Problem in Dry Beans in 2021. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.

Insect/Mite	Rank	Insect/Mite	Rank
Aphids		Leafhoppers	
Armyworms		Seed corn maggot	
Bean leaf beetle		Spider mites	
Cutworms		Wireworms	
Foliage caterpillars		None	
Grasshoppers			

Field Scouting in Dry Beans in 2021. For each question, please circle the best answer that applies to your operation.

How do you scout for insects?
I do it Crop consultant Don't scout

How do you scout for diseases?
I do it Crop consultant Don't scout

How do you scout for weeds?
I do it Crop consultant Don't scout

Do you follow recommended economic thresholds when making insect control decisions?
Yes No

Fungicides and Disease Problems

Foliar Fungicides Used on Dry Beans in 2021.
If you did not use a foliar fungicide, please write "0" for acres treated.

Foliar Fungicide (write in name or number from the list below)	Acres Treated	No. of Applications	Application Method (circle one for each application)	
			air	ground
			air	ground
			air	ground

Foliar Fungicide Products

1. Aframe	22. Incognito	43. Quadris
2. Aproach	23. Kenja	44. Quadris Opti
3. Aprovia Top	24. Kocide	45. Quash
4. Arius Adv	25. Mastercop	46. Quilt
5. AZteroid (in-furrow)	26. Meteor	47. Rovral
6. Badge	27. Microthiol	48. Sanidate
7. Basicop	28. Miravis Neo	49. Satori
8. Bravo	29. Miravis Top	50. Serenade
9. Cannonball	30. Monsoon	51. Switch
10. Cercobin	31. Nevado	52. Tebucure
11. Champ	32. Omega	53. Tebuzol
12. ChampION	33. Onset	54. Tetraban
13. Cuprofix	34. Orius	55. T-methyl
14. Delaro	35. Oxidate	56. Topsin
15. Echo	36. Oxiphos	57. Vabro
16. Endura	37. Phostrol	58. Veltyma
17. Equation	38. Praiz	59. Vertisan
18. Equus	39. Priaxor	60. Viathon
19. Evito	40. Proline	61. Xanthion (in-furrow)
20. Fontelis	41. ProPulse	62. None used
21. Headline	42. Provysol	63. Other (specify)

In-furrow Fungicide Applications Made on Dry Beans in 2021. If you did not make an in-furrow fungicide application, please write "0" for acres treated.

In-furrow Fungicide (write in name or number from Foliar Fungicide Product list.	Acres Treated

Seed Treatment Fungicides Used on Dry Beans in 2021.
If you did not use a seed treatment fungicide, please write "0" for acres treated.

Seed Treatment Fungicide (write in name or number from the list below)	Acres Treated

Seed Treatment Fungicide Products

1. Allegiance	12. Heads Up	23. Signet
2. Apron Maxx	13. Maxim	24. Spirato
3. Apron XL	14. Mertect	25. Stamina
4. Belmont	15. Obvious	26. Thiram
5. Captan	16. Obvious Plus	27. Vibrance
6. Chloroneb	17. Prevail	28. Vibrance Maxx
7. Cruiser Maxx	18. Rancona	29. Vibrance Trio
8. Cruiser Maxx Vibrance	19. Rancona Summit	30. Vitaflo
9. Dyna-Shield	20. Rizolex	31. Vitavax
10. Dynasty	21. Saxony	32. None used
11. EverGol Energy	22. Sebring	33. Other (specify)

Worst Disease Problem in Dry Beans in 2021. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.			
Disease	**Rank**	**Disease**	**Rank**
Anthracnose		Other viruses (general)	
Bacterial brown spot		Root rot	
Bacterial wilt		Rust	
Bean common mosaic virus		White mold	
Common bacterial blight		None	
Halo blight			

Herbicides and Weed Problems

Weed Control Practices Used on Dry Beans in 2021. Count double herbicide applications, double cultivation, as double acres.		
Weed Control Used (write in name or number from the list below)	**Bean Class**	**Acres Treated**

Weed Control Products and Practices		
1. Assure	10. Outlook	19. Spartan Charge
2. Basagran/gen.	11. Permit	20. Trifluralin
3. BroadAxe/Spartan Elite	12. Poast	21. Varisto
4. Dual/generics	13. Prowl	22. Cover crops
5. Eptam	14. Pursuit	23. Cultivation
6. Fusiliade DX	15. Raptor	24. Rotary hoe
7. Glyphosate (preplant)	16. Reflex	25. Manual labor
8. Glyphosate (postharvest)	17. Select/gen.	26. None
9. NDSU Micro-Rate	18. Sonalan	27. Other (specify)

Worst Weed Problem in Dry Beans in 2021. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.			
Weed	**Rank**	**Weed**	**Rank**
Biennial wormwood		Ragweed	
Black medic		Redroot pigweed	
Canada thistle		Smartweed	
Cocklebur		Sunflower	
Downy brome (cheatgrass)		Venice mallow	
Foxtail (pigeongrass)		Volunteer canola	
Horseweed (Marestail)		Volunteer grain	
Kochia		Waterhemp	
Lambsquarters		Wild buckwheat	
Lanceleaf sage		Wild mustard	
Nightshade		Wild oat	
Prostrate pigweed		None	
Quackgrass		Other (specify)	

Desiccants Used on Dry Beans in 2021. Count double applications as double acres.		
Desiccants Used (Write in name or number from the list below. If tank mixed, please write products on the same line). EXAMPLE: 1+3 or Glyphosate+Sharpen	**Bean Class**	**Acres Treated**

Desiccant Products		
1. Glyphosate	3. Sharpen	5. Valor
2. Paraquat	4. Sodium chlorate (Leafex, Defol)	6. Aim

Thank you for completing the 2021 Dry Bean Grower Survey!

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Cover photos (top to bottom)

Juan Osorno, NDSU
dry edible bean pods

Joe Ikley, NDSU
dry edible beans damaged by
herbicide carryover

Veronica Calles Torrez, NDSU
adult two-striped grasshopper