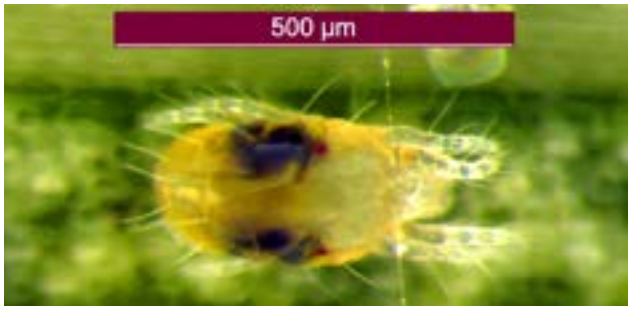

E2014 (March 2021)

2020 DRY BEAN Grower Survey

of Production, Pest Problems and Pesticide Use

in Minnesota and North Dakota

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In cooperation with the Northarvest Bean Growers Association

NDSU | EXTENSION

North Dakota State University, Fargo, ND

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Introduction

The 2020 dry bean grower survey is the 31st 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 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 2004-2019 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 North Dakota State University or the Northarvest Bean Growers Association.

Acknowledgments

A grant from the Northarvest Bean Growers Association funded the survey.

Production

Table 1. Number of Northarvest dry bean growers responding, acres planted by respondents and total state acres in 2020.

Growers	No. of respondents	Respondents' acres	Total acres[a]	Acres surveyed (% of total)
Minnesota	91	46,644	275,000	17
North Dakota	145	100,245	815,000	12.3
Northarvest	236	146,889	1,090,000	13.5

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

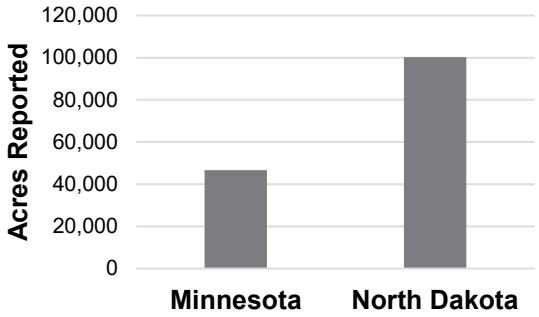

Figure 1. Northarvest dry bean acres planted by state in 2020 (respondents' acres only).

Table 2. Dry bean production by county in 2020.

Minnesota	No. of respon-dents[a]	Acres[b]	North Dakota	No. of respon-dents[a]	Acres[b]
Polk	17	8,830	Grand Forks	30	18,517
Swift	12	4,163	Walsh	28	13,330
Stevens	8	3,717	Pembina	18	10,349
Otter Tail	6	3,438	Traill	16	8,520
Pope	6	3,044	Wells	7	7,202
Hubbard	2	2,915	Benson	10	6,495
Mahnomen	6	2,712	Steele	12	5,791
Wadena	6	2,510	Cass	6	4,409
Marshall	5	2,108	Ramsey	4	4,340
Stearns	6	1,954	Ransom	4	2,929
Kandiyohi	5	1,407	Oliver	1	2,522
Renville	8	1,239	Cavalier	5	2,359
Chippewa	6	1,185	Nelson	5	2,037
Pennington	5	1,119	Griggs	3	1,705
Benton	2	968	McLean	3	1,461
Todd	1	750	LaMoure	2	1,318
Norman	3	654	Stutsman	2	950
McLeod	2	630	McHenry	2	935
Clay	2	566	Barnes	3	810
Becker	1	430	Towner	2	740
Morrison	2	386	Sargent	2	653
Kittson	1	300	Dickey	2	605
Sherburne	1	300	Pierce	1	600
Meeker	2	283	Ward	1	525
Douglas	1	250	Eddy	2	420
Lac qui Parle	1	240	Foster	1	275
Beltrami	1	200	Burleigh	1	213
Wilkin	1	181	Logan	1	140
Big Stone	1	95	Rolette	1	95
Brown	1	35			
Cass	1	35			
Total		**46,644**	**Total**		**100,245**

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

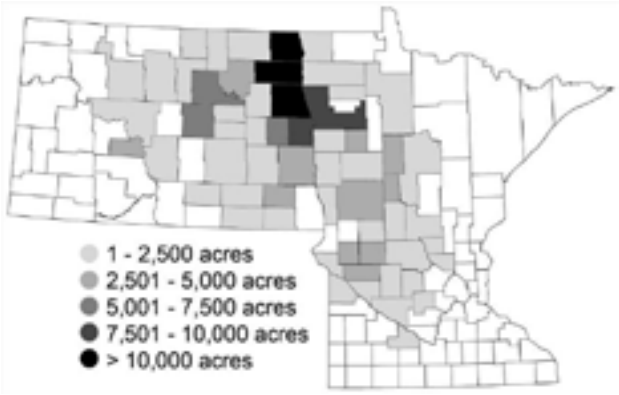

Figure 2. Northarvest dry bean production by county in 2020 (respondents' acres only).

Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground and damaged by water in 2020.

	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Planted	46,664	100
Harvested	46,065	98.7
Irrigated	15,597	33.4
Tile-drained	13,537	29
Water damage (beans harvested)	6,475	13.9
Water damage (beans not harvested)	546	1.2
North Dakota		
Planted	100,245	100
Harvested	98,234	98
Irrigated	4,403	4.4
Tile-drained	8,416	8.4
Water damage (beans harvested)	20,029	20
Water damage (beans not harvested)	5,182	5.2
Northarvest		
Planted	146,909	100
Harvested	144,299	98.2
Irrigated	20,000	13.6
Tile-drained	21,953	14.9
Water damage (beans harvested)	26,504	18
Water damage (beans not harvested)	5,728	3.9

[a]Respondents' acres only.

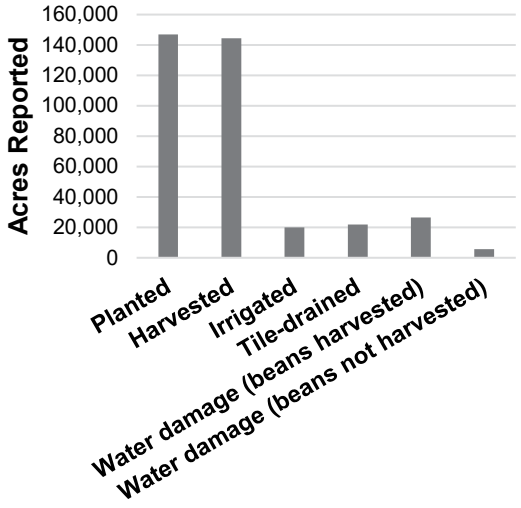

Figure 3. Northarvest respondents' reported acres from Table 3.

Table 4. Dry bean market classes grown in 2020.

Market class	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Kidney	19,324	41.4
Black	12,276	26.3
Navy	12,048	25.8
Pinto	2,440	5.2
Pink	375	0.8
Cranberry	181	0.4
Total	**46,644**	**100**
North Dakota		
Pinto	68,424	68.3
Navy	13,292	13.3
Black	12,302	12.3
Small Red	4,594	4.6
Great Northern	630	0.6
Cranberry	450	0.4
Pink	304	0.3
Kidney	249	0.2
Total	**100,245**	**100**
Northarvest		
Pinto	70,864	48.2
Navy	25,340	17.3
Black	24,578	16.7
Kidney	19,573	13.3
Small Red	4,594	3.1
Pink	679	0.5
Cranberry	631	0.4
Great Northern	630	0.4
Total	**146,889**	**100**

[a]Respondents' acres only.

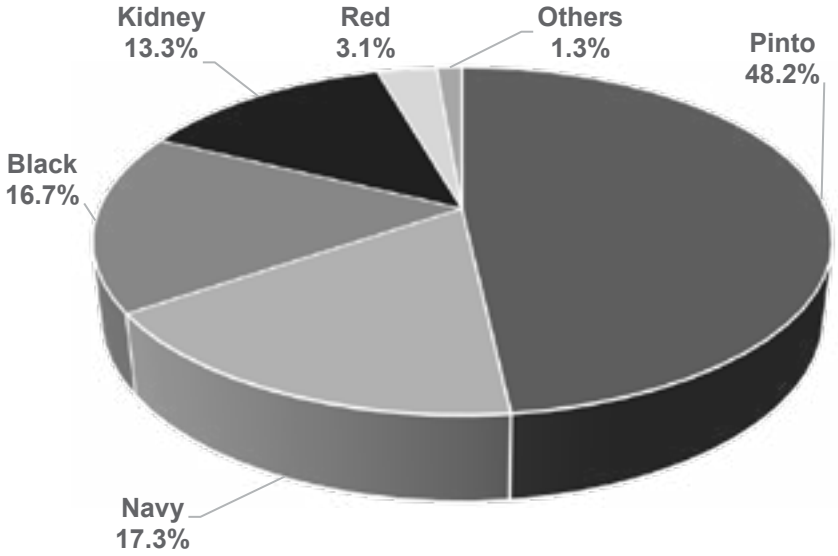

Figure 4. Northarvest dry bean market classes grown in 2020.

Table 5. Dry bean varieties grown in 2020.

Variety	Class	Minnesota[a]	%[b]	North Dakota[a]	%[b]	Northarvest[a]	%[b]
Eclipse	Black	5,700	12.2	5,862	5.8	11,562	7.9
Black Tails	Black	2,635	5.6	3,989	4	6,624	4.5
Zorro	Black	2,044	4.4	150	0.1	2,194	1.5
Black Bear	Black	500	1.1	640	0.6	1,140	0.8
Blackbeard	Black	244	0.5	540	0.5	784	0.5
Zenith	Black	432	0.9	300	0.3	732	0.5
Spectre	Black	646	1.4	0	0	646	0.4
Black Cat	Black	75	0.2	561	0.6	636	0.4
Black (not specified)	Black	0	0	160	0.2	160	0.1
ND Twighlight	Black	0	0	100	0.1	100	0.1
Total Black	**Black**	**12,276**	**26.3**	**12,302**	**12.3**	**24,578**	**16.7**
Etna	Cranberry	181	0.4	450	0.4	631	0.4
Total Cranberry	**Cranberry**	**181**	**0.4**	**450**	**0.4**	**631**	**0.4**
Pegasus	GN	0	0	330	0.3	330	0.2
Draco	GN	0	0	300	0.3	300	0.2
Total GN	**GN**	**0**	**0**	**630**	**0.6**	**630**	**0.4**
Montcalm	Kidney	3,512	7.5	249	0.2	3,761	2.6
Dynasty	Kidney	3,621	7.8	0	0	3,621	2.5
Red Hawk	Kidney	3,034	6.5	0	0	3,034	2.1
Pink Panther	Kidney	2,469	5.3	0	0	2,469	1.7
Beluga	Kidney	1,301	2.8	0	0	1,301	0.9
Clouseau	Kidney	1,265	2.7	0	0	1,265	0.9
Cabernet	Kidney	1,115	2.4	0	0	1,115	0.8
Red Rover	Kidney	903	1.9	0	0	903	0.6
Epic	Kidney	719	1.5	0	0	719	0.5
Big Red	Kidney	323	0.7	0	0	323	0.2
Chaparral	Kidney	240	0.5	0	0	240	0.2
Kidney (not specified)	Kidney	200	0.4	0	0	200	0.1
Rampart	Kidney	150	0.3	0	0	150	0.1
Red Cedar	Kidney	150	0.3	0	0	150	0.1
Spire	Kidney	147	0.3	0	0	147	0.1
Ronnie's Red	Kidney	100	0.2	0	0	100	0.1
Foxfire	Kidney	75	0.2	0	0	75	0.1
Total Kidney	**Kidney**	**19,324**	**41.4**	**249**	**0.2**	**19,573**	**13.3**
HMS Medalist	Navy	3,850	8.3	9,515	9.5	13,365	9.1
T-9905	Navy	5,911	12.7	2,568	2.6	8,479	5.8
Blizzard	Navy	1,645	3.5	1,199	1.2	2,844	1.9
Alpena	Navy	324	0.7	0	0	324	0.2
Armada	Navy	123	0.3	0	0	123	0.1
Norstar	Navy	100	0.2	0	0	100	0.1
ISB 2884-4	Navy	70	0.2	0	0	70	0
Provita 13066	Navy	25	0.1	0	0	25	0
Navy (not specified)	Navy	0	0	10	0	10	0
Total Navy	**Navy**	**12,048**	**25.8**	**13,292**	**13.3**	**25,340**	**17.3**
Floyd	Pink	225	0.5	150	0.1	375	0.3
Rosetta	Pink	0	0	154	0.2	154	0.1
Magnolia	Pink	150	0.3	0	0	150	0.1
Total Pink	**Pink**	**375**	**0.8**	**304**	**0.3**	**679**	**0.5**
Monterrey	Pinto	0	0	12,414	12.4	12,414	8.5
Vibrant (SD)	Pinto	0	0	9,301	9.3	9,301	6.3
Torreon	Pinto	0	0	8,868	8.8	8,868	6
La Paz	Pinto	550	1.2	8,026	8	8,576	5.8
Windbreaker	Pinto	660	1.4	6,922	6.9	7,582	5.2
ND Palomino (SD)	Pinto	930	2	6,325	6.3	7,255	4.9
Radiant (SD)	Pinto	200	0.4	2,845	2.8	3,045	2.1
Cowboy	Pinto	0	0	2,926	2.9	2,926	2
AC Island	Pinto	0	0	1,995	2	1,995	1.4
Santa Cruz	Pinto	60	0.1	1,628	1.6	1,688	1.1
Lumen (SD)	Pinto	0	0	1,425	1.4	1,425	1
Maverick	Pinto	0	0	1,000	1	1,000	0.7
Gleam (SD)	Pinto	0	0	755	0.8	755	0.5
Stampede	Pinto	0	0	705	0.7	705	0.5
Lariat	Pinto	0	0	700	0.7	700	0.5
Sinaloa	Pinto	0	0	544	0.5	544	0.4
ND Falcon	Pinto	40	0.1	500	0.5	540	0.4
Rough Rider	Pinto	0	0	497	0.5	497	0.3
White Mountain (SD)	Pinto	0	0	400	0.4	400	0.3
Sonora	Pinto	0	0	200	0.2	200	0.1
SV6139GR	Pinto	0	0	195	0.2	195	0.1
Buster	Pinto	0	0	173	0.2	173	0.1
Pinto (not specified)	Pinto	0	0	80	0.1	80	0.1
Total Pinto	**Pinto**	**2,440**	**5.2**	**68,424**	**68.3**	**70,864**	**48.2**
Ruby	Small Red	0	0	2,954	2.9	2,954	2
Eclipse	Black	5,700	12.2	5,862	5.8	11,562	7.9
Merlot	Small Red	0	0	1,140	1.1	1,140	0.8
Viper	Small Red	0	0	500	0.5	500	0.3
Total Small Red	**Small Red**	**0**	**0**	**4,594**	**4.6**	**4,594**	**3.1**
Grand Total	**All Classes**	**46,644**	**100**	**100,245**	**100**	**146,889**	**100**

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

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	7	8.5	4,609	10.6
No	14	17.1	8,868	20.3
I don't know	61	74.4	30,149	69.1
Total	**82**	**100**	**43,626**	**100**
North Dakota				
Yes	56	40.3	42,280	43.3
No	33	23.7	25,755	26.4
I don't know	50	36	29,661	30.4
Total	**139**	**100**	**97,696**	**100**
Northarvest				
Yes	63	28.5	46,889	33.2
No	47	21.3	34,623	24.5
I don't know	111	50.2	59,810	42.3
Total	**221**	**100**	**141,322**	**100**

[a]Respondents who grew pinto beans in 2020.
[b]2020 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	3	21.4	2,110	22.9
No	11	78.6	7,109	77.1
Total	**14**	**100**	**9,219**	**100**
North Dakota				
Yes	48	42.1	34,772	42.1
No	66	57.9	47,773	57.9
Total	**114**	**100**	**82,545**	**100**
Northarvest				
Yes	51	39.8	36,882	40.2
No	77	60.2	54,882	59.8
Total	**128**	**100**	**91,764**	**100**

[a]Respondents who grew pinto beans in 2020.
[b]2020 pinto bean production acres only.

Table 8. Why do you think SD pintos are not a good alternative?

Reason	Minnesota Respondents (no.)[a]	Minnesota Respondents (%)[b]	North Dakota Respondents (no.)[a]	North Dakota Respondents (%)[b]	Northarvest Respondents (no.)[a]	Northarvest Respondents (%)[b]
Price	10	50	54	45.4	64	46
Poor agronomic performance of SD varieties	6	30	49	41.2	55	39.6
Lack of grower knowledge about benefits of SD pintos	8	40	29	24.4	37	26.6
Lack of markets	5	25	29	24.4	34	24.5
Lack of industry knowledge about benefits of SD pintos	1	5	13	10.9	14	10.1
Lack of consumer knowledge about benefits of SD pintos	0	0	13	10.9	13	9.4

[a]Respondents who grew pinto beans in2020. [b]Percentages do not total 100 because respondents could choose multiple responses.

Table 9. Dry bean production problems reported in 2020.

Production problem	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Diseases	25	29.8	11,845	27.4
Water damage (beans harvested)	42	50	6,475	15
Frost (average reported yield loss = 14.8%)	16	19	5,377	12.5
Hail	23	27.4	4,411	10.2
Weeds	34	40.5	3,613	8.4
Emergence/stand	16	19	3,179	7.4
Wind	11	13.1	2,925	6.8
Harvest	15	17.9	1,806	4.2
Delayed planting	6	7.1	1,321	3.1
Herbicide carryover injury	4	4.8	1,010	2.3
Applied herbicide injury	5	6	873	2
Insects	4	4.8	743	1.7
Water damage (beans not harvested)	19	22.6	546	1.3
Micronutrient deficiency	2	2.4	534	1.2
Drought	6	7.1	437	1
Soybean cyst nematode	1	1.2	300	0.7
Soil salinity	5	6	255	0.6
Herbicide drift injury	3	3.6	31	0.1
North Dakota				
Frost (average reported yield loss = 14.7%)	66	47.1	25,306	26.3
Water damage (beans harvested)	79	56.4	20,029	20.8
Drought	23	16.4	8,897	9.2
Emergence/stand	25	17.9	8,200	8.5
Delayed planting	23	16.4	7,794	8.1
Hail	27	19.3	6,320	6.6
Weeds	31	22.1	5,830	6
Water damage (beans not harvested)	58	41.4	5,182	5.4
Diseases	9	6.4	2,836	2.9
Herbicide drift injury	7	5	2,525	2.6
Applied herbicide injury	5	3.6	2,035	2.1
Wind	7	5	1,908	2
Harvest	18	12.9	1,860	1.9
Soil salinity	31	22.1	1,401	1.5
Insects	2	1.4	715	0.7
Herbicide carryover injury	2	1.4	35	0
Wildlife	1	0.7	3	0
Northarvest				
Frost (average reported yield loss = 14.7%)	82	36.6	30,683	22
Water damage (beans harvested)	121	54	26,504	19
Diseases	34	15.2	14,681	10.5
Emergence/stand	41	18.3	11,379	8.2
Hail	50	22.3	10,731	7.7
Weeds	65	29	9,443	6.8
Drought	29	12.9	9,334	6.7
Delayed planting	29	12.9	9,115	6.5
Water damage (beans not harvested)	77	34.4	5,728	4.1
Wind	18	8	4,833	3.5
Harvest	33	14.7	3,666	2.6
Applied herbicide injury	10	4.5	2,908	2.1
Herbicide drift injury	10	4.5	2,556	1.8
Soil salinity	36	16.1	1,656	1.2
Insects	6	2.7	1,458	1
Herbicide carryover injury	6	2.7	1,045	0.7
Micronutrient deficiency	2	0.9	534	0.4
Soybean cyst nematode	1	0.4	300	0.2
Wildlife	1	0.4	3	0

[a]Respondents' acres only.

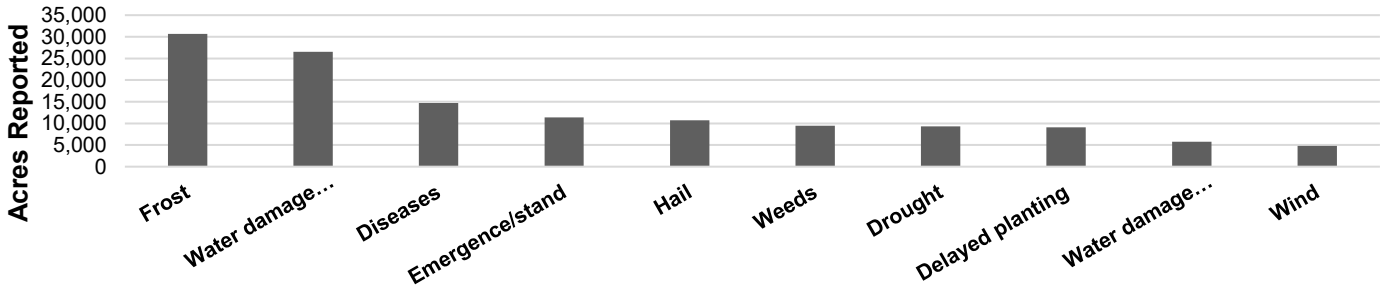

Figure 5. Northarvest respondents' reported acres for top 10 dry bean production problems in 2020.

Table 10. Purchased seed size problems that affected acreage planting intentions in 2020.

				Not enough seed			Too much seed		
Variety	Class	Respondents (no.)	Acres reported[a]	Respondents (no.)	Acres affected[a]	%	Respondents (no.)	Acres affected[a]	%
Minnesota									
Eclipse	Black	22	5,700	1	50	0.9	1	40	0.7
Cabernet	Kidney	2	1,115	1	350	31.4	0	0	0
Dynasty	Kidney	9	3,621	0	0	0	1	15	0.4
Montcalm	Kidney	12	3,512	0	0	0	1	15	0.4
Red Hawk	Kidney	10	3,034	0	0	0	1	15	0.5
Rampart	Kidney	2	150	0	0	0	1	10	6.7
Blizzard	Navy	11	1,645	1	25	1.5	0	0	0
HMS Medalist	Navy	19	3,850	2	30	0.8	0	0	0
North Dakota									
Montcalm	Kidney	2	249	0	0	0	1	10	4
Cowboy	Pinto	14	2,926	1	10	0.3	0	0	0
Monterrey	Pinto	35	12,414	2	55	0.4	0	0	0
ND Palomino	Pinto	20	6,325	1	15	0.2	0	0	0
Torreon	Pinto	22	8,868	1	50	0.6	0	0	0
Ruby	Small Red	7	2,954	0	0	0	1	15	0.5
Northarvest									
Eclipse	Black	42	11562	1	50	0.4	1	40	0.3
Cabernet	Kidney	2	1115	1	350	31.4	0	0	0
Dynasty	Kidney	9	3621	0	0	0	1	15	0.4
Montcalm	Kidney	14	3761	0	0	0	2	25	0.7
Red Hawk	Kidney	10	3034	0	0	0	1	15	0.5
Rampart	Kidney	2	150	0	0	0	1	10	6.7
Blizzard	Navy	17	2844	1	25	0.9	0	0	0
HMS Medalist	Navy	44	13365	2	30	0.2	0	0	0
Cowboy	Pinto	14	2926	1	10	0.3	0	0	0
Monterrey	Pinto	35	12414	2	55	0.4	0	0	0
ND Palomino	Pinto	23	7255	1	15	0.2	0	0	0
Torreon	Pinto	22	8868	1	50	0.6	0	0	0
Ruby	Small Red	7	2954	0	0	0	1	15	0.5

[a]Respondents' acres only.

Table 11. Row spacing by dry bean market class in 2020.

	Black[a]		Cranberry		Great Northern		Kidney		Navy[a]		Pink		Pinto[a]		Red	
Row spacing	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Minnesota																
< 11 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 to 15 inches	2	5.3	0	0	0	0	0	0	1	3	0	0	1	20	0	0
16 to 20 inches	3	7.9	0	0	0	0	0	0	1	3	0	0	0	0	0	0
21 to 25 inches	24	63.2	0	0	0	0	11	40.7	23	69.7	0	0	3	60	0	0
26 to 30 inches	9	23.7	0	0	0	0	16	59.3	8	24.2	1	100	1	20	0	0
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**38**	**100**	**0**	**0**	**0**	**0**	**27**	**100**	**33**	**100**	**1**	**100**	**5**	**100**	**0**	**0**
North Dakota																
< 11 inches	2	6.3	0	0	0	0	0	0	0	0	0	0	2	1.8	0	0
11 to 15 inches	1	3.1	0	0	0	0	0	0	0	0	0	0	5	4.5	0	0
16 to 20 inches	4	12.5	0	0	0	0	0	0	0	0	0	0	10	8.9	1	10
21 to 25 inches	20	62.5	1	100	1	50	0	0	19	70.4	0	0	40	35.7	5	50
26 to 30 inches	5	15.6	0	0	1	50	2	100	8	29.6	0	0	54	48.2	3	30
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9	1	10
Total	**32**	**100**	**1**	**100**	**2**	**100**	**2**	**100**	**27**	**100**	**0**	**0**	**112**	**100**	**10**	**100**
Northarvest																
< 11 inches	2	2.9	0	0	0	0	0	0	0	0	0	0	2	1.7	0	0
11 to 15 inches	3	4.3	0	0	0	0	0	0	1	1.7	0	0	6	5.1	0	0
16 to 20 inches	7	10	0	0	0	0	0	0	1	1.7	0	0	10	8.5	1	10
21 to 25 inches	44	62.9	1	100	1	50	11	37.9	42	70	0	0	43	36.8	5	50
26 to 30 inches	14	20	0	0	1	50	18	62.1	16	26.7	1	100	55	47	3	30
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9	1	10
Total	**70**	**100**	**1**	**100**	**2**	**100**	**29**	**100**	**60**	**100**	**1**	**100**	**117**	**100**	**10**	**100**

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

Table 12. Seeding rate by dry bean market class in 2020.

	Black[b]		Cranberry		Great Northern		Kidney		Navy[b]		Pink		Pinto[b]		Red	
Seeding rate[a]	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Minnesota																
<60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60 to 69,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70 to 79,000	0	0	0	0	0	0	6	23.1	0	0	0	0	2	40	0	0
80 to 89,000	3	8.6	0	0	0	0	10	38.5	1	3.1	1	100	3	60	0	0
90 to 99,000	2	5.7	1	100	0	0	8	30.8	1	3.1	0	0	0	0	0	0
100 to 109,000	5	14.3	0	0	0	0	2	7.7	5	15.6	0	0	0	0	0	0
110 to 119,000	17	48.6	0	0	0	0	0	0	16	50	0	0	0	0	0	0
120 to 129,000	6	17.1	0	0	0	0	0	0	6	18.8	0	0	0	0	0	0
> 129,000	2	5.7	0	0	0	0	0	0	3	9.4	0	0	0	0	0	0
Total	**35**	**100**	**1**	**100**	**0**	**0**	**26**	**100**	**32**	**100**	**1**	**100**	**5**	**100**	**0**	**0**
North Dakota																
<60,000	2	7.1	0	0	0	0	0	0	1	3.7	0	0	1	1	0	0
60 to 69,000	0	0	0	0	0	0	0	0	0	0	0	0	7	6.7	0	0
70 to 79,000	2	7.1	0	0	1	33.3	0	0	1	3.7	1	100	48	45.7	0	0
80 to 89,000	1	3.6	1	100	2	66.7	2	100	1	3.7	0	0	42	40	6	60
90 to 99,000	1	3.6	0	0	0	0	0	0	5	18.5	0	0	3	2.9	2	20
100 to 109,000	10	35.7	0	0	0	0	0	0	5	18.5	0	0	3	2.9	2	20
110 to 119,000	8	28.6	0	0	0	0	0	0	7	25.9	0	0	1	1	0	0
120 to 129,000	4	14.3	0	0	0	0	0	0	6	22.2	0	0	0	0	0	0
> 129,000	0	0	0	0	0	0	0	0	1	3.7	0	0	0	0	0	0
Total	**28**	**100**	**1**	**100**	**3**	**100**	**2**	**100**	**27**	**100**	**1**	**100**	**105**	**100**	**10**	**100**
Northarvest																
<60,000	2	3.2	0	0	0	0	0	0	1	1.7	0	0	1	0.9	0	0
60 to 69,000	0	0	0	0	0	0	0	0	0	0	0	0	7	6.4	0	0
70 to 79,000	2	3.2	0	0	1	33.3	6	21.4	1	1.7	1	50	50	45.5	0	0
80 to 89,000	4	6.3	1	50	2	66.7	12	42.9	2	3.4	1	50	45	40.9	6	60
90 to 99,000	3	4.8	1	50	0	0	8	28.6	6	10.2	0	0	3	2.7	2	20
100 to 109,000	15	23.8	0	0	0	0	2	7.1	10	16.9	0	0	3	2.7	2	20
110 to 119,000	25	39.7	0	0	0	0	0	0	23	39	0	0	1	0.9	0	0
120 to 129,000	10	15.9	0	0	0	0	0	0	12	20.3	0	0	0	0	0	0
> 129,000	2	3.2	0	0	0	0	0	0	4	6.8	0	0	0	0	0	0
Total	**63**	**100**	**2**	**100**	**3**	**100**	**28**	**100**	**59**	**100**	**2**	**100**	**110**	**100**	**10**	**100**

[a]Live seeds per acre.

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

Table 13. Percent of total dry bean acres harvested by direct combining in 2020.

Percent direct combined	Respondents (no.)	Respondents (%)	Acres reported[a]	Acres reported[a] (%)
Minnesota				
1 to 25%	5	5.6	6,994	15.5
26 to 50%	2	2.2	2,031	4.5
51 to 75%	1	1.1	180	0.4
76 to 99%	4	4.4	1,561	3.5
100%	58	64.4	20,832	46.1
No direct harvest	20	22.2	13,607	30.1
Total	**90**	**100**	**45,205**	**100**
North Dakota				
1 to 25%	4	2.8	4,448	4.5
26 to 50%	5	3.4	7,545	7.7
51 to 75%	6	4.1	7,174	7.3
76 to 99%	13	9	8,100	8.2
100%	97	66.9	60,809	61.9
No direct harvest	20	13.8	10,158	10.3
Total	**145**	**100**	**98,234**	**100**
Northarvest				
1 to 25%	9	3.8	7,925	5.5
26 to 50%	7	3	5,603	3.9
51 to 75%	7	3	7,610	5.3
76 to 99%	17	7.2	6,536	4.6
100%	155	66	78,939	55
No direct harvest	40	17	12,026	8.4
Total	**235**	**100**	**143,439**	**100**

[a]Respondents' harvested acres only.

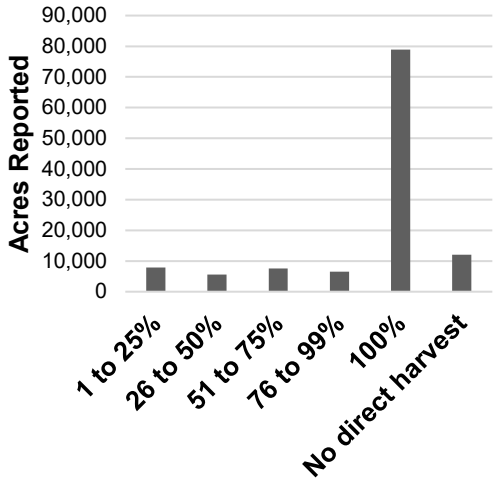

Figure 6. Northarvest percent of dry bean acres harvested by direct combining in 2020.

Table 14. Estimated yield loss in harvested dry beans in 2020.

	Direct Harvest		Indirect Harvest	
Estimated yield loss	Respondents (no.)	Respondents (%)	Respondents (no.)	Respondents (%)
Minnesota				
0%	2	2.8	1	3.1
1 to 5%	38	53.5	19	59.4
6 to 10%	22	31	12	37.5
11 to 15%	8	11.3	0	0
16 to 20%	1	1.4	0	0
Total	**71**	**100**	**32**	**100**
North Dakota				
0%	2	1.6	1	2
1 to 5%	61	48.4	33	67.3
6 to 10%	40	31.7	11	22.4
11 to 15%	20	15.9	2	4.1
16 to 20%	3	2.4	2	4.1
Total	**126**	**100**	**49**	**100**
Northarvest				
0%	4	2	2	3.3
1 to 5%	99	50.3	43	70.5
6 to 10%	62	31.5	13	21.3
11 to 15%	28	14.2	2	3.3
16 to 20%	4	2	1	1.6
Total	**197**	**100**	**61**	**100**

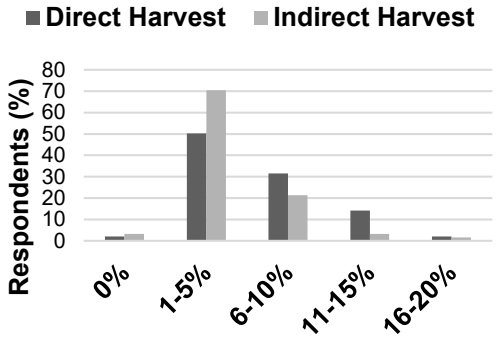

Figure 7. Northarvest estimated yield loss in harvested dry beans in 2020.

Table 15. Dry bean field tillage practices in 2020.

Tillage practice	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota		
Conventional	38,163	85.8
Minimum	6,204	13.9
Strip-tillage	72	0.2
No-till	40	0.1
Total	**44,479**	**100**
North Dakota		
Conventional	65,180	65
Minimum	22,729	22.7
No-till	3,450	3.4
Strip-tillage	8,885	8.9
Total	**100,244**	**100**
Northarvest		
Conventional	103,343	71.4
Minimum	28,933	20
No-till	3,522	2.4
Strip-tillage	8,925	6.2
Total	**144,723**	**100**

[a]Respondents' acres only.

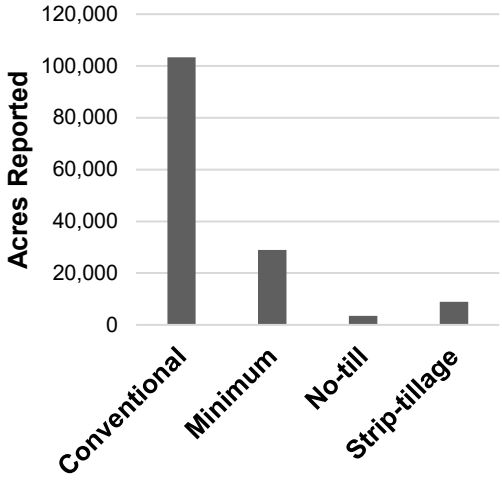

Figure 8. Northarvest dry bean field tillage practices in 2020.

Agronomy

Table 16. Cover crop use on dry bean fields in 2020.

Cover crop use	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Yes	31	34.4	18,907	41.1
No	59	65.6	27,137	58.9
Total	**90**	**100**	**46,044**	**100**
North Dakota				
Yes	19	13.3	16,801	17.3
No	124	86.7	80,594	82.7
Total	**143**	**100**	**97,395**	**100**
Northarvest				
Yes	50	21.5	35,708	24.9
No	183	78.5	107,731	75.1
Total	**233**	**100**	**143,439**	**100**

[a]Respondents' acres only.

Table 17. Reasons for cover crop use on dry bean fields in 2020.

Cover crop practice	Respondents (no.)	Respondents (%)[a]
Minnesota		
Soil conservation	31	100
Moisture conservation	7	22.6
Weed control	9	29
Grazing	0	0
Soil health	3	9.7
North Dakota		
Soil conservation	17	89.5
Moisture conservation	6	31.6
Weed control	9	47.4
Grazing	1	5.3
Soil health	1	5.3
Northarvest		
Soil conservation	48	96
Moisture conservation	13	26
Weed control	18	36
Grazing	1	2
Soil health	4	8

[a]Percentages do not total 100% because some respondents gave more than one reason.

Table 18. Seasonal use of cover crops on dry bean fields in 2020.

Cover crop seasonal use	Respondents (no.)	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[a]
Minnesota				
Before dry bean production	11	35.5	8,681	45.9
During dry bean production	1	3.2	165	0.9
After dry bean production	24	77.4	13,686	72.4
North Dakota				
Before dry bean production	6	31.6	5,716	34.0
During dry bean production	2	10.5	2,780	16.5
After dry bean production	12	63.2	9,385	55.9
Northarvest				
Before dry bean production	17	34.0	14,397	40.3
During dry bean production	3	6.0	2,945	8.2
After dry bean production	36	72.0	23,071	64.6

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

Table 19. Cover crop species composition on dry bean fields in 2020.

Cover crop species composition	Respondents (no.)	Respondents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Cereal grass species only	24	77.4	17,324	91.6
Cereal grass + broadleaf species	5	16.1	1,123	5.9
Broadleaf species only	2	6.5	460	2.4
Total	**31**	**100**	**18,907**	**100**
North Dakota				
Cereal grass species only	15	78.9	13,021	77.5
Cereal grass + broadleaf species	3	15.8	2,080	12.4
Broadleaf species only	1	5.3	1,700	10.1
Total	**19**	**100**	**16,801**	**100**
Northarvest				
Cereal grass species only	39	78	30,345	85
Cereal grass + broadleaf species	8	16	3,203	9
Broadleaf species only	3	6	2,160	6
Total	**50**	**100**	**35,708**	**100**

[a]Respondents' acres only.

Table 20. Ground rolling on dry bean fields in 2020.

Timing	Respondents (no.)	Respondents (%)[a]	Acres reported (no.)[b]	Acres reported (%)[b]
Minnesota				
Pre-plant	15	16.9	6,293	14.1
Pre-emerge	38	42.7	10,359	23.2
Post-emerge	3	3.4	713	1.6
Did not roll	45	50.6	27,329	61.1
Total			**44,694**	**100**
North Dakota				
Pre-plant	13	9.1	8,219	8.3
Pre-emerge	81	56.6	54,828	55.1
Post-emerge	11	7.7	5,519	5.5
Did not roll	56	39.2	30,915	31.1
Total			**99,481**	**100**
Northarvest				
Pre-plant	28	12.1	14,512	10.1
Pre-emerge	119	51.3	65,187	45.2
Post-emerge	14	6	6,232	4.3
Did not roll	101	43.5	58,244	40.4
Total			**144,175**	**100**

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

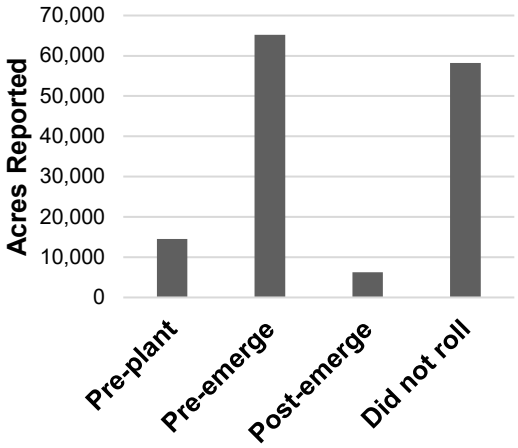

Figure 9. Northarvest ground rolling on dry bean fields in 2020.

Table 21. Ground rolling and direct harvest on dry bean fields in 2020.

	Ground Rolling			
Percent Direct Combined	**Yes**		**No**	
Minnesota	**Respondents (no.)**	**Respondents (%)**	**Respondents (no.)**	**Respondents (%)**
0%	0	0	20	44.4
1 to 25%	3	5.8	4	8.9
26 to 50%	2	3.8	1	2.2
51 to 75%	1	1.9	1	2.2
76 to 99%	3	5.8	1	2.2
100%	43	82.7	18	40
Total	**52**	**100**	**45**	**100**
North Dakota				
0%	3	3.1	17	30.4
1 to 25%	4	4.1	4	7.1
26 to 50%	4	4.1	3	5.4
51 to 75%	5	5.1	5	8.9
76 to 99%	10	10.2	3	5.4
100%	72	73.5	24	42.9
Total	**98**	**100**	**56**	**100**
Northarvest				
0%	3	2	37	36.6
1 to 25%	7	4.7	8	7.9
26 to 50%	6	4	4	4
51 to 75%	6	4	6	5.9
76 to 99%	13	8.7	4	4
100%	115	76.7	42	41.6
Total	**150**	**100**	**101**	**100**

Table 22. Use of fertilizers on dry bean fields in 2020.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Nitrogen	79	98.8
Phosphorus	66	82.5
Potash	58	72.5
Zinc	50	62.5
Sulfur	47	58.8
North Dakota		
Nitrogen	112	90.3
Phosphorus	103	83.1
Potash	51	41.1
Zinc	81	65.3
Sulfur	46	37.1
Northarvest		
Nitrogen	191	93.6
Phosphorus	169	82.8
Potash	109	53.4
Zinc	131	64.2
Sulfur	93	45.6

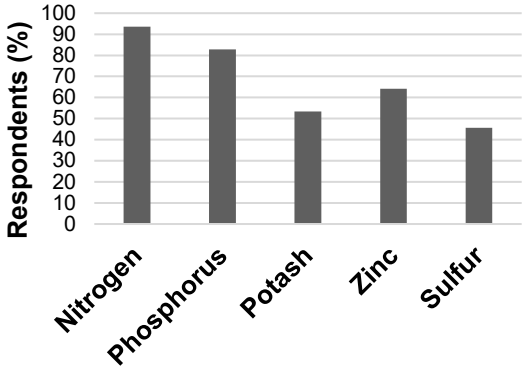

Figure 10. Northarvest use of fertilizers on dry bean fields in 2020.

Table 23. Fertilizer application methods on dry bean fields in 2020.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Broadcast	83	93.3
In-furrow	34	38.2
Foliar	15	16.9
Banded	11	12.4
North Dakota		
Broadcast	120	88.2
In-furrow	54	39.7
Foliar	18	13.2
Banded	16	11.8
Northarvest		
Broadcast	203	90.2
In-furrow	88	39.1
Foliar	33	14.7
Banded	27	12

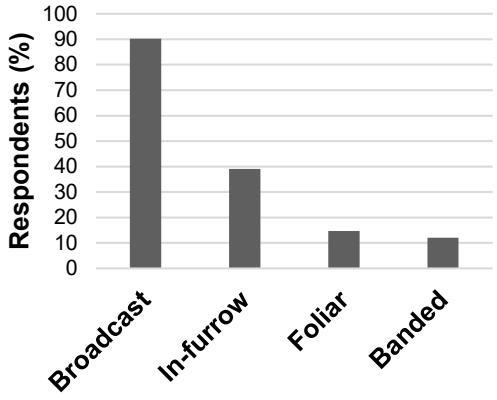

Figure 11. Northarvest fertilizer application methods on dry bean fields in 2020.

Table 24. Use of soil test prior to fertilization of dry bean fields in 2020.

Soil test	Respondents (no.)	Respondents (%)
Minnesota		
Soil test used	70	78.7
Soil test not used	19	21.3
Total	**89**	**100**
North Dakota		
Soil test used	104	75.9
Soil test not used	33	24.1
Total	**137**	**100**
Northarvest		
Soil test used	174	77
Soil test not used	52	23
Total	**226**	**100**

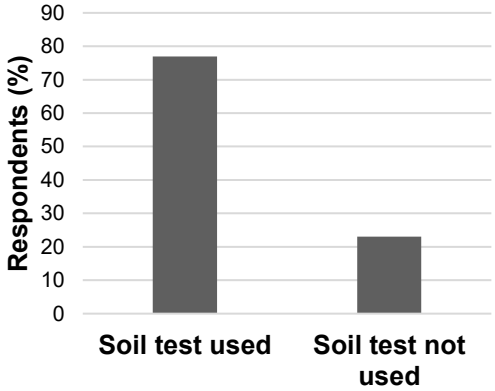

Figure 12. Northarvest use of soil test in 2020.

Table 25. Use of *Rhizobium* inoculants on dry bean fields in 2020.

Rhizobium use	Respondents (no.)	Respondents (%)
Minnesota		
Inoculant used	24	28.2
Inoculant not used	61	71.8
Total	**85**	**100**
North Dakota		
Inoculant used	33	26
Inoculant not used	94	74
Total	**127**	**100**
Northarvest		
Inoculant used	57	26.9
Inoculant not used	155	73.1
Total	**212**	**100**

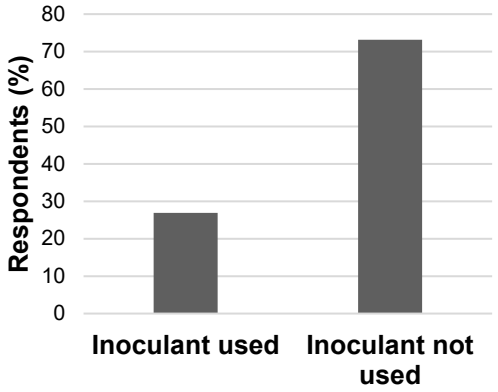

Figure 13. Northarvest use of inoculant in 2020.

Table 26. Use of site-specific nutrient management (SSNM) on dry bean fields in 2020.

	Respondents (no.)	Respondents (%)
Minnesota		
SSNM used	34	39.1
SSNM not used	53	60.9
Total	**87**	**100**
North Dakota		
SSNM used	41	31.3
SSNM not used	90	68.7
Total	**131**	**100**
Northarvest		
SSNM used	75	34.4
SSNM not used	143	65.6
Total	**218**	**100**

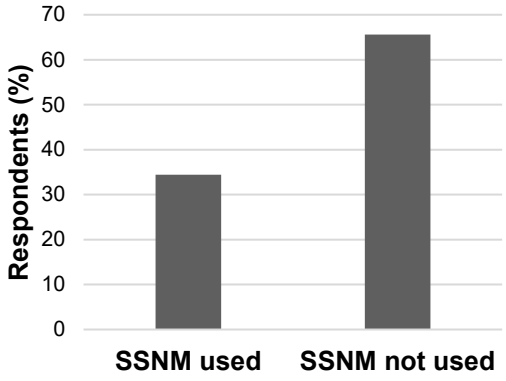

Figure 14. Northarvest use of site-specific nutrient management in 2020.

Table 27. Desiccants used on dry beans in 2020.

Desiccant	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[a]	Acres reported (%)[a]
Minnesota				
Sharpen	57	65.5	22,571	50.5
Valor	24	27.6	12,329	27.6
Paraquat	24	27.6	8,019	17.9
None used	14	16.1	7,383	16.5
Glyphosate	2	2.3	989	2.2
Sodium chlorate	1	1.1	386	0.9
Desiccant Total			**51,677**	
North Dakota	139		98,242	
Sharpen	90	64.7	51,030	51.9
Paraquat	51	36.7	30,488	31
Valor	36	25.9	22,434	22.8
None used	34	24.5	18,423	18.8
Glyphosate	25	18	16,727	17
Sodium chlorate	5	3.6	3,119	3.2
Desiccant Total			**142,221**	
Northarvest	226		142,917	
Sharpen	147	65	73,601	51.5
Paraquat	75	33.2	38,507	26.9
Valor	60	26.5	34,763	24.3
None used	48	21.2	25,806	18.1
Glyphosate	27	11.9	17,716	12.4
Sodium chlorate	6	2.7	3,505	2.5
Desiccant Total			**193,898**	

[a]Respondents' acres only.

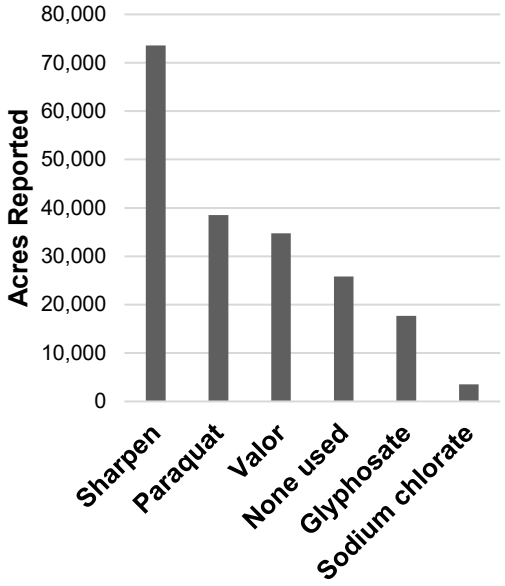

Figure 15. Northarvest desiccants used on dry beans in 2020.

Table 28. Desiccant tank mixes used on dry beans in 2020.

Desiccant Combination	Respondents (no.)	Acres reported (no.)
Minnesota		
Paraquat + Sharpen	8	2,717
Sharpen + Valor	4	2,200
Paraquat + Valor	3	1,191
Paraquat + Sodium chlorate + Valor	1	386
Glyphosate + Valor	1	300
North Dakota		
Paraquat + Sharpen	18	10,468
Glyphosate + Sharpen	10	9,075
Glyphosate + Valor	11	7,946
Sharpen + Valor	6	6,724
Paraquat + Valor	8	5,695
Sharpen + Sodium chlorate	3	2,575
Glyphosate + Paraquat	1	1,500
Northarvest		
Paraquat + Sharpen	26	13,185
Glyphosate + Sharpen	10	9,075
Sharpen + Valor	10	8,924
Glyphosate + Valor	12	8,246
Paraquat + Valor	11	6,886
Sharpen + Sodium chlorate	3	2,575
Glyphosate + Paraquat	1	1,500
Paraquat + Sodium chlorate + Valor	1	386

Table 29. Frequency of previous crops (2016-2019) in fields planted to dry beans in 2020.

Year	2019	2018	2017	2016	4-year average
Crop	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)
Minnesota					
Corn	65.2	37.1	57	44.3	50.9
Soybeans	4.5	40.4	22.1	35.4	25.6
Dry beans	5.6	18	22.1	27.8	18.4
Wheat	20.2	16.9	20.9	6.3	16.1
Sugarbeets	23.6	16.9	8.1	13.9	15.6
Potatoes	7.9	7.9	4.7	7.6	7
Alfalfa	2.2	3.4	3.5	5.1	3.5
Field peas	1.1	3.4	2.3	1.3	2
Barley	1.1	2.2	1.2	1.3	1.4
Oats	0	1.1	0	0	0.3
North Dakota					
Wheat	66	23.7	56.6	24.2	42.6
Dry beans	2.1	36.3	15.5	50	26
Corn	38.3	7.4	34.9	15.8	24.1
Soybeans	0.7	34.8	13.2	29.2	19.5
Sugarbeets	19.1	12.6	4.7	8.3	11.2
Barley	10.6	4.4	4.7	5.8	6.4
Potatoes	0.7	6.7	0.8	1.7	2.5
Canola	0	5.2	0	0.8	1.5
Field peas	0	3	0.8	0.8	1.1
No crop	0.7	0	0.8	0.8	0.6
Alfalfa	0	0	0.8	0.8	0.4
Flax	0	0	0	0.8	0.2
Sunflowers	0	0	0	0.8	0.2
Hay/grass	0.7	0	0	0	0.2
Oats	0.7	0	0	0	0.2
Northarvest					
Corn	48.7	19.2	43.7	27.1	34.7
Wheat	48.3	21	42.3	17.1	32.2
Dry beans	3.5	29	18.1	41.2	23
Soybeans	2.2	37.1	16.7	31.7	21.9
Sugarbeets	20.9	14.3	6	10.6	12.9
Barley	7	3.6	3.3	4	4.5
Potatoes	3.5	7.1	2.3	4	4.2
Alfalfa	0.9	1.3	1.9	2.5	1.6
Field peas	0.4	3.1	1.4	1	1.5
Canola	0	3.1	0	0.5	0.9
No crop	0.4	0	0.5	0.5	0.4
Oats	0.4	0.4	0	0	0.2
Flax	0	0	0	0.5	0.1
Sunflowers	0	0	0	0.5	0.1
Hay/grass	0.4	0	0	0	0.1

Table 30. 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	41	46.1
2 of past 5 years	39	43.8
3 of past 5 years	6	6.7
4 of past 5 years	1	1.1
5 of past 5 years	2	2.2
Total	**89**	100
North Dakota		
1 of past 5 years	52	36.9
2 of past 5 years	53	37.6
3 of past 5 years	31	22
4 of past 5 years	3	2.1
5 of past 5 years	2	1.4
Total	**141**	100
Northarvest		
1 of past 5 years	93	40.4
2 of past 5 years	92	40
3 of past 5 years	37	16.1
4 of past 5 years	4	1.7
5 of past 5 years	4	1.7
Total	**230**	100

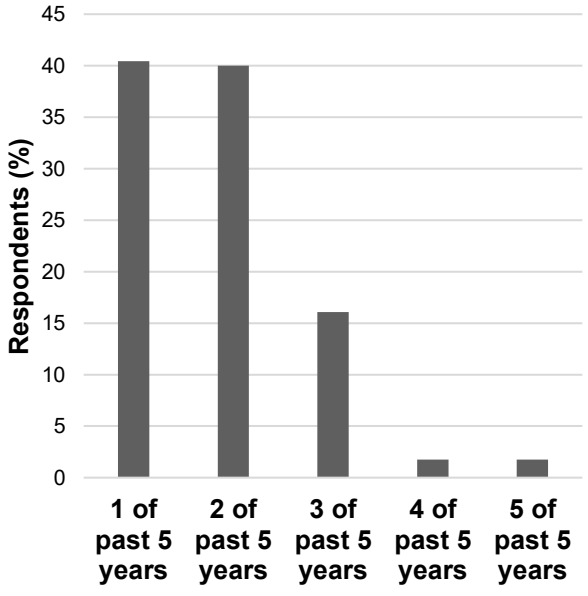

Figure 16. Northarvest number of years dry beans are grown in dry bean crop rotation program.

Insect Pests and Insecticide Use

Table 31. Worst insect problem in dry beans in 2020.

Insect[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
None	29	34.9	15,096	35.6
Leafhoppers	30	36.1	14,450	34.1
Foliage caterpillars	8	9.6	4,168	9.8
Aphids	4	4.8	3,050	7.2
Cutworms	3	3.6	1,880	4.4
Armyworms	2	2.4	1,227	2.9
Seed corn maggot	2	2.4	1,186	2.8
Grasshoppers	3	3.6	700	1.6
Spider mites	2	2.4	674	1.6
Total	**83**	**100**	**42,431**	**100**
North Dakota				
None	51	40.5	38,707	43.9
Grasshoppers	51	40.5	28,472	32.3
Leafhoppers	6	4.8	6,723	7.6
Cutworms	3	2.4	2,818	3.2
Bean leaf beetle	2	1.6	2,296	2.6
Seed corn maggot	2	1.6	2,218	2.5
Spider mites	2	1.6	1,950	2.2
Wireworms	2	1.6	1,907	2.2
Foliage caterpillars	2	1.6	1,532	1.7
Armyworms	2	1.6	855	1
Aphids	3	2.4	669	0.8
Total	**126**	**100**	**88,147**	**100**
Northarvest				
None	80	38.3	53,803	41.2
Grasshoppers	54	25.8	29,172	22.3
Leafhoppers	36	17.2	21,173	16.2
Foliage caterpillars	10	4.8	5,700	4.4
Cutworms	6	2.9	4,698	3.6
Aphids	7	3.3	3,719	2.8
Seed corn maggot	4	1.9	3,404	2.6
Spider mites	4	1.9	2,624	2
Bean leaf beetle	2	1	2,296	1.8
Armyworms	4	1.9	2,082	1.6
Wireworms	2	1	1,907	1.5
Total	**209**	**100**	**130,578**	**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.

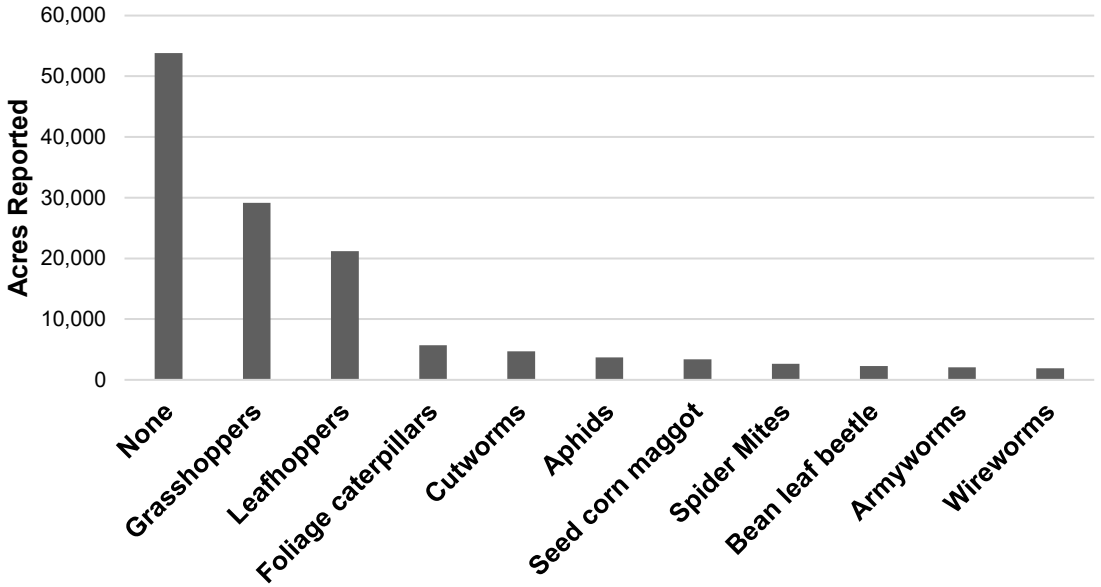

Figure 17. Northarvest worst insect problem in dry beans in 2020.

Table 32. Insects ranked as one of the three worst in dry beans in 2020.

Insect[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
Leafhoppers	39	47	19,876	46.8
None	29	34.9	15,096	35.6
Grasshoppers	19	22.9	8,668	20.4
Aphids	13	15.7	6,222	14.7
Foliage caterpillars	10	12	5,022	11.8
Seed corn maggot	6	7.2	4,586	10.8
Bean leaf beetle	7	8.4	3,260	7.7
Armyworms	6	7.2	2,741	6.5
Cutworms	6	7.2	2,476	5.8
Wireworms	3	3.6	2,240	5.3
Spider mites	6	7.2	2,184	5.1
North Dakota				
Grasshoppers	64	50.8	39,120	44.4
None	51	40.5	38,707	43.9
Leafhoppers	22	17.5	18,382	20.9
Cutworms	17	13.5	11,426	13
Wireworms	11	8.7	8,377	9.5
Aphids	13	10.3	7,507	8.5
Spider mites	8	6.3	6,305	7.2
Foliage caterpillars	10	7.9	5,765	6.5
Bean leaf beetle	8	6.3	5,442	6.2
Seed corn maggot	5	4	3,789	4.3
Armyworms	5	4	2,372	2.7
Northarvest				
None	80	38.3	53,803	41.2
Grasshoppers	83	39.7	47,788	36.6
Leafhoppers	61	29.2	38,258	29.3
Cutworms	23	11	13,902	10.6
Aphids	26	12.4	13,729	10.5
Foliage caterpillars	20	9.6	10,787	8.3
Wireworms	14	6.7	10,617	8.1
Bean leaf beetle	15	7.2	8,702	6.7
Spider mites	14	6.7	8,489	6.5
Seed corn maggot	11	5.3	8,375	6.4
Armyworms	11	5.3	5,113	3.9

[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.

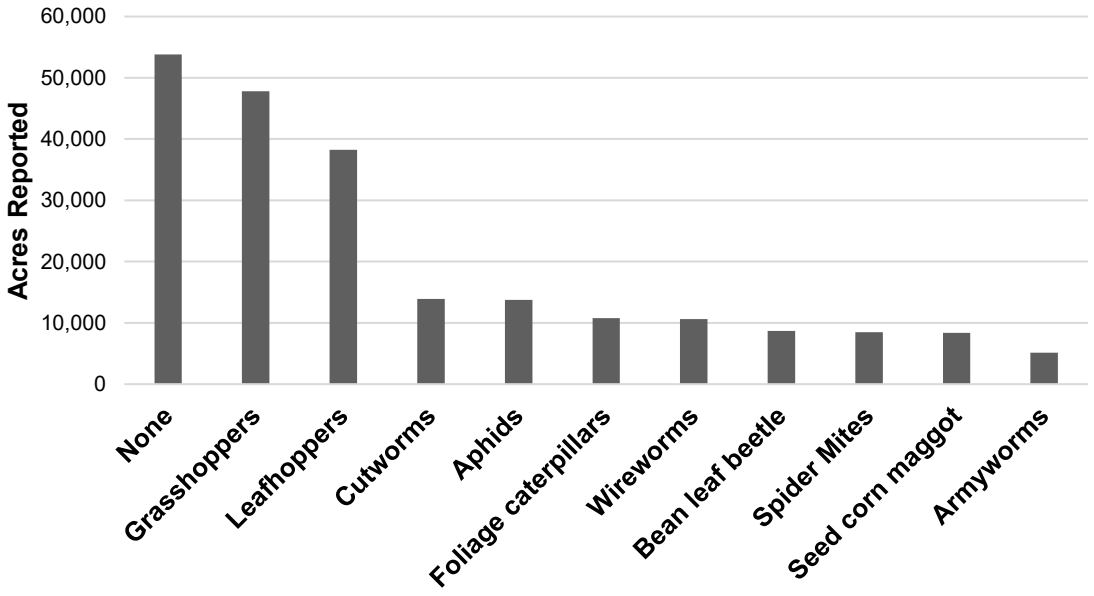

Figure 18. Northarvest insects ranked as one of the three worst in dry beans in 2020.

Table 33. Foliar insecticide use in dry beans in 2020.

Insecticide	Respondents (no.)	Respondents (%)	Acres reported (no.)[a,b]	Acres reported (%)[a,b]
Minnesota				
None	55	64	21,235	47.7
Warrior II/generics	19	22.1	8,833	19.9
Asana XL	10	11.6	4,868	10.9
Hero	2	2.3	4,130	9.3
Lorsban[c]	5	5.8	4,049	9.1
Tombstone	1	1.2	850	1.9
Brigade/generics	1	1.2	180	0.4
Baythroid XL	1	1.2	175	0.4
Mustang Maxx	2	2.3	153	0.3
Insecticide Total			**23,238**	
North Dakota				
None	124	87.9	83,168	86
Warrior II/generics	15	10.6	8,660	9
Baythroid XL	3	2.1	2,600	2.7
Brigade/generics	1	0.7	1,100	1.1
Lorsban[c]	3	2.1	813	0.8
Mustang Maxx	2	1.4	403	0.4
Insecticide Total			**13,576**	
Northarvest				
None	179	78.9	104,403	73.9
Warrior II/generics	34	15	17,493	12.4
Asana XL	10	4.4	4,868	3.4
Lorsban[c]	8	3.5	4,862	3.4
Hero	2	0.9	4,130	2.9
Baythroid XL	4	1.8	2,775	2
Brigade/generics	2	0.9	1,280	0.9
Tombstone	1	0.4	850	0.6
Mustang Maxx	4	1.8	556	0.4
Insecticide Total			**36,814**	

[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 are labeled for preplant applications only.

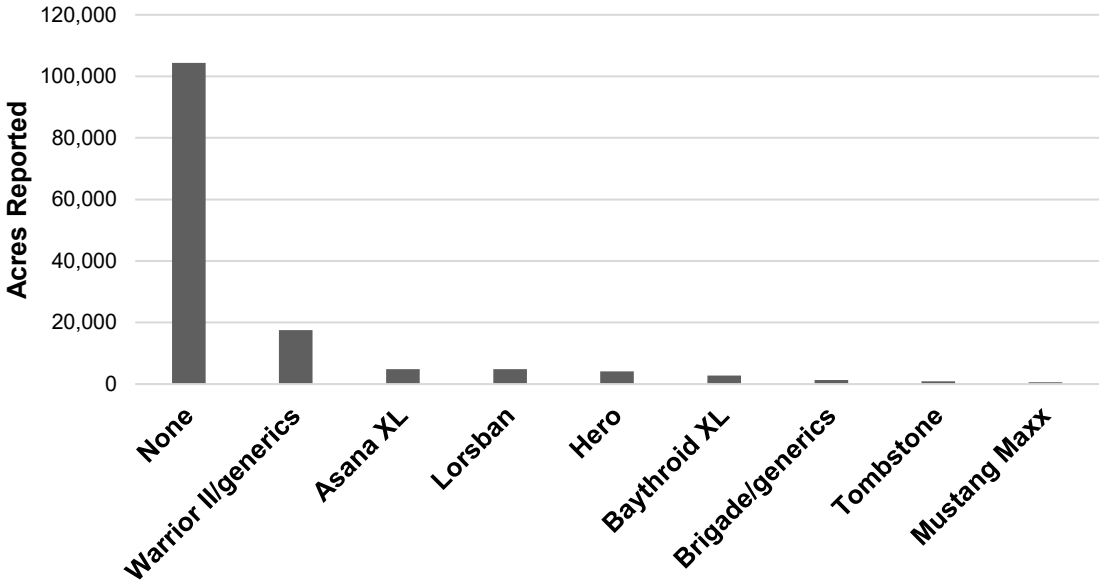

Figure 19. Northarvest foliar insecticide use in dry beans in 2020.

Table 34. Soil insecticide and seed treatment use in dry beans in 2020.

Seed Treatment	Respondents (no.)	Respondents (%)	Acres reported (no.)[a,b]	Acres reported (%)[a,b]
Minnesota				
Cruiser Maxx	48	55.8	25,933	59.6
None	23	26.7	8,960	20.6
Don't know	9	10.5	5,134	11.8
Lorsban	7	8.1	5,065	11.6
Cruiser Maxx Vibrance	6	7	2,958	6.8
Gaucho 600	4	4.7	2,704	6.2
DynaShield Imidacloprid	2	2.3	1,170	2.7
Capture LFR	2	2.3	456	1
Enhance AW	1	1.2	374	0.9
Insecticide Total			**43,794**	
North Dakota				
Cruiser Maxx	51	37	35,666	37.9
None	39	28.3	28,032	29.8
Don't know	25	18.1	12,951	13.7
Cruiser Maxx Vibrance	15	10.9	9,604	10.2
Lorsban	12	8.7	8,984	9.5
Capture LFR	3	2.2	3,665	3.9
Cruiser 5FS	3	2.2	3,095	3.3
Gaucho 600	2	1.4	2,480	2.6
DynaShield Imidacloprid	1	0.7	655	0.7
Enhance AW	2	1.4	433	0.5
Insecticide Total			**77,533**	
Northarvest				
Cruiser Maxx	99	44.2	61,599	44.7
None	62	27.7	36,992	26.9
Don't know	34	15.2	18,085	13.1
Lorsban	19	8.5	14,049	10.2
Cruiser Maxx Vibrance	21	9.4	12,562	9.1
Gaucho 600	6	2.7	5,184	3.8
Capture LFR	5	2.2	4,121	3
Cruiser 5FS	3	1.3	3,095	2.2
DynaShield Imidacloprid	3	1.3	1,825	1.3
Enhance AW	3	1.3	807	0.6
Insecticide Total			**121,327**	

[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.

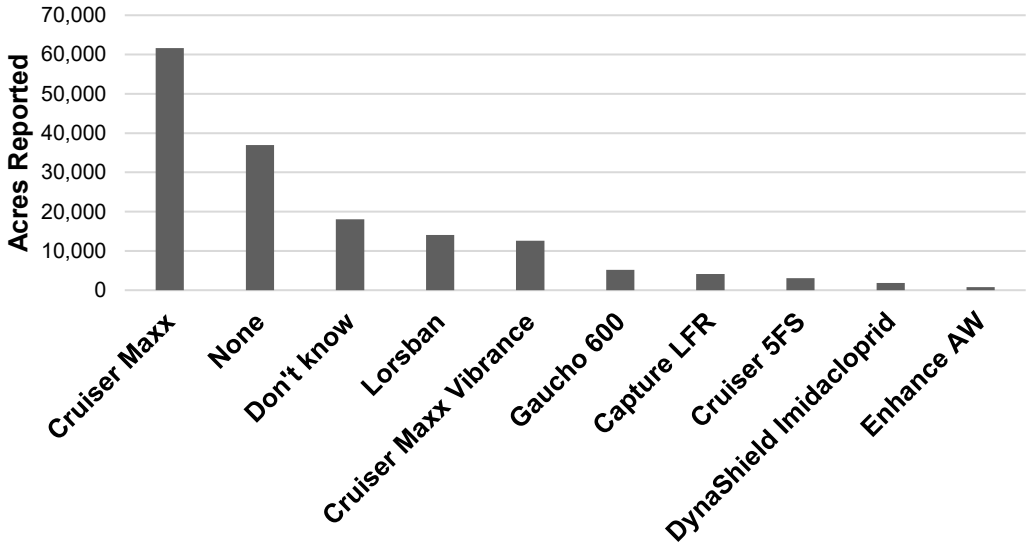

Figure 20. Northarvest insecticide seed treatment and soil insecticide use in dry beans in 2020.

Table 35. Worst disease problem in dry beans in 2020.

Disease[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
White mold	38	44.7	19,116	41.4
Common bacterial blight	24	28.2	15,337	33.2
Bacterial brown spot	2	2.4	3,046	6.6
None	11	12.9	2,670	5.8
Root rot	4	4.7	2,498	5.4
Bacterial wilt	3	3.5	2,027	4.4
Other viruses	1	1.2	1,055	2.3
Halo blight	1	1.2	220	0.5
Anthracnose	1	1.2	180	0.4
Total	**85**	**100**	**46,149**	**100**
North Dakota				
White mold	68	49.6	51,875	53.7
None	28	20.4	16,807	17.4
Common bacterial blight	18	13.1	12,715	13.2
Rust	8	5.8	5,745	5.9
Root rot	8	5.8	4,714	4.9
Bacterial brown spot	4	2.9	2,475	2.6
Bacterial wilt	1	0.7	1,100	1.1
Halo blight	1	0.7	750	0.8
Anthracnose	1	0.7	465	0.5
Total	**137**	**100**	**96,646**	**100**
Northarvest				
White mold	106	47.7	70,991	49.7
Common bacterial blight	42	18.9	28,052	19.6
None	39	17.6	19,477	13.6
Root rot	12	5.4	7,212	5.1
Rust	8	3.6	5,745	4
Bacterial brown spot	6	2.7	5,521	3.9
Bacterial wilt	4	1.8	3,127	2.2
Other viruses	1	0.5	1,055	0.7
Halo blight	2	0.9	970	0.7
Anthracnose	2	0.9	645	0.5
Total	**222**	**100**	**142,795**	**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.

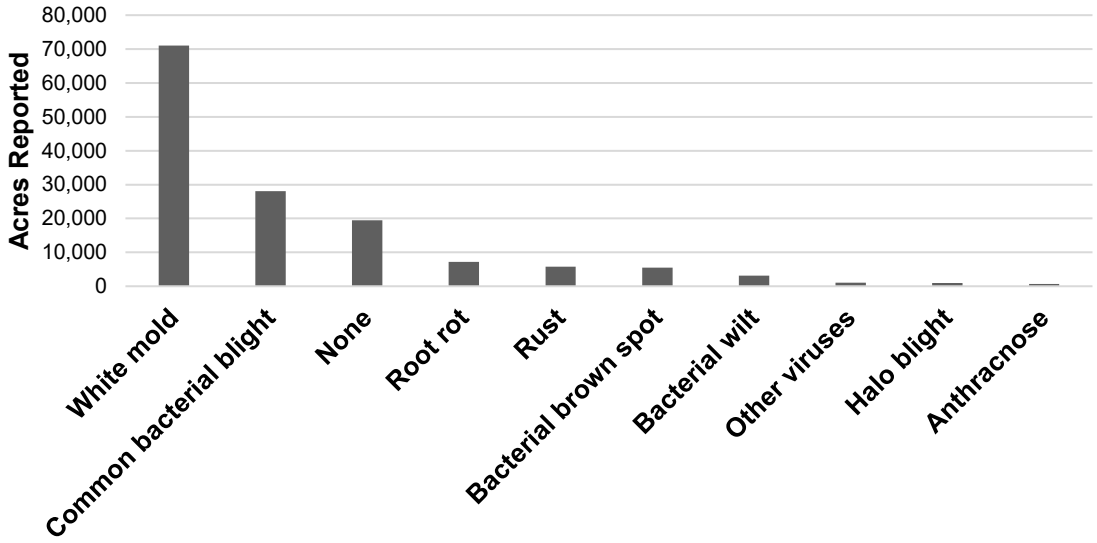

Figure 21. Northarvest worst disease problem in dry beans in 2020.

Table 36. Diseases ranked as one of the three worst in dry beans in 2020.

Disease[a]	Respondents (no.)	Respondents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
White mold	61	71.8	37,358	81
Common bacterial blight	53	62.4	35,743	77.5
Root rot	25	29.4	15,844	34.3
Bacterial brown spot	8	9.4	5,971	12.9
Halo blight	7	8.2	4,465	9.7
Rust	8	9.4	4,427	9.6
Bacterial wilt	7	8.2	3,210	7
Anthracnose	9	10.6	2,934	6.4
Viruses (general)	4	4.7	2,815	6.1
None	11	12.9	2,670	5.8
Bean common mosaic virus	1	1.2	349	0.8
North Dakota				
White mold	95	69.3	70,521	73
Common bacterial blight	55	40.1	40,187	41.6
Rust	33	24.1	22,468	23.2
Root rot	28	20.4	21,387	22.1
None	28	20.4	16,807	17.4
Bacterial brown spot	20	14.6	12,796	13.2
Anthracnose	10	7.3	10,633	11
Halo blight	9	6.6	8,169	8.5
Viruses (general)	10	7.3	7,009	7.3
Bacterial wilt	8	5.8	5,319	5.5
Bean common mosaic virus	2	1.5	785	0.8
Northarvest				
White mold	156	70.3	107,879	75.5
Common bacterial blight	108	48.6	75,930	53.2
Root rot	53	23.9	37,231	26.1
Rust	41	18.5	26,895	18.8
None	39	17.6	19,477	13.6
Bacterial brown spot	28	12.6	18,767	13.1
Anthracnose	19	8.6	13,567	9.5
Halo blight	16	7.2	12,634	8.8
Viruses (general)	14	6.3	9,824	6.9
Bacterial wilt	15	6.8	8,529	6
Bean common mosaic virus	3	1.4	1,134	0.8

[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.

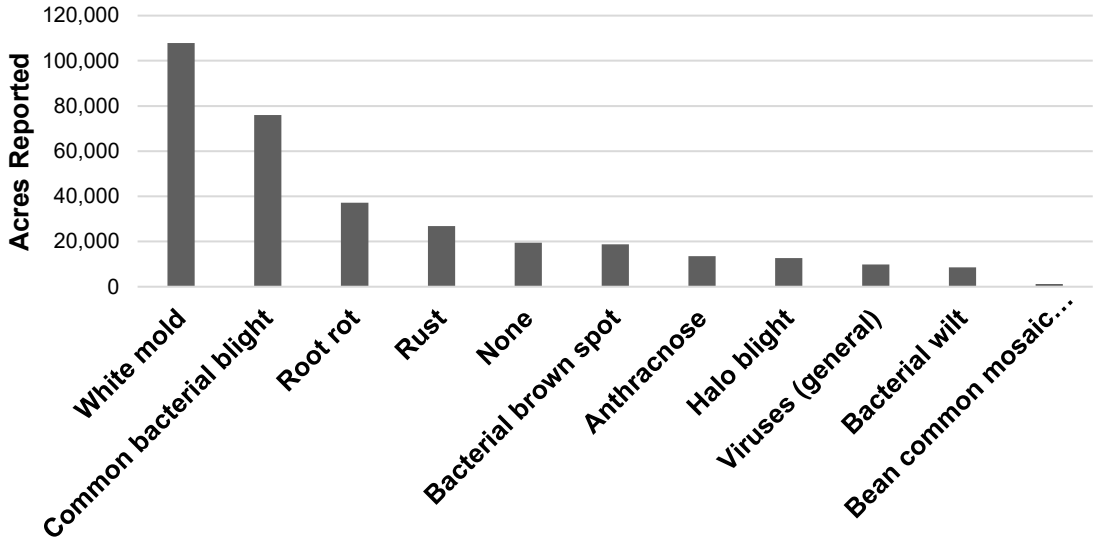

Figure 22. Northarvest diseases ranked as one of the three worst in dry beans in 2020.

Table 37. Foliar fungicide use in dry beans in 2020.

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								
T-methyl	33	36.7	26,537	57.1	24,737	26.3	1,800	1.9
Endura	42	46.7	21,218	45.7	19,301	20.5	1,917	2
Topsin broadcast	20	22.2	11,772	25.3	10,130	10.8	1,642	1.7
Omega	2	2.2	6,660	14.3	6,660	7.1	0	0
ProPulse	4	4.4	5,000	10.8	5,000	5.3	0	0
Proline broadcast	6	6.7	4,747	10.2	4,747	5	0	0
Tebuzol	4	4.4	2,750	5.9	2,750	2.9	0	0
Badge	5	5.6	2,275	4.9	2,175	2.3	100	0.1
Calcium	1	1.1	1,690	3.6	1,690	1.8	0	0
Priaxor	7	7.8	1,544	3.3	1,374	1.5	170	0.2
Incognito	3	3.3	1,415	3	1,415	1.5	0	0
None	6	6.7	1,411	3	---	---	---	---
Oxidate	4	4.4	1,340	2.9	512	0.5	828	0.9
Headline	2	2.2	1,200	2.6	1,200	1.3	0	0
Miravis Neo	2	2.2	1,186	2.6	1,186	1.3	0	0
Topsin banded	2	2.2	1,015	2.2	1,015	1.1	0	0
Tebucure	1	1.1	860	1.9	860	0.9	0	0
Quadris/Amstar	1	1.1	815	1.8	815	0.9	0	0
Proline banded	1	1.1	800	1.7	800	0.9	0	0
Delaro	1	1.1	600	1.3	600	0.6	0	0
Champ	4	4.4	433	0.9	233	0.2	200	0.2
Sanidate	1	1.1	160	0.3	160	0.2	0	0
Fungicide Total			**94,017**		**87,360**	**92.9**	**6,657**	**7.1**
North Dakota								
Endura	59	41	34,955	35.9	31,058	22.6	3,897	2.8
Topsin broadcast	27	18.8	34,107	35	28,967	21.1	5,140	3.7
T-methyl	45	31.3	32,518	33.4	29,753	21.7	2,765	2
None	33	22.9	14,980	15.4	---	---	---	---
Priaxor	13	9	11,413	11.7	10,363	7.5	1,050	0.8
Folicur	3	2.1	5,150	5.3	5,150	3.7	0	0
Tebuzol	7	4.9	5,025	5.2	5,025	3.7	0	0
Headline	4	2.8	3,241	3.3	3,241	2.4	0	0
Proline broadcast	3	2.1	2,010	2.1	2,010	1.5	0	0
Onset	3	2.1	1,565	1.6	1,565	1.1	0	0
Switch	1	0.7	1,500	1.5	1,500	1.1	0	0
Praiz	2	1.4	1,200	1.2	1,000	0.7	200	0.1
Aproach	1	0.7	1,000	1	1,000	0.7	0	0
ProPulse	1	0.7	800	0.8	800	0.6	0	0
Orius	1	0.7	700	0.7	700	0.5	0	0
Incognito	2	1.4	525	0.5	525	0.4	0	0
Equation	1	0.7	500	0.5	500	0.4	0	0
Tebucure	1	0.7	500	0.5	500	0.4	0	0
Omega	1	0.7	400	0.4	400	0.3	0	0
Arius ADV	1	0.7	250	0.3	250	0.2	0	0
Fungicide Total			**137,359**		**124,307**	**90.5**	**13,052**	**9.5**
Northarvest								
T-methyl	78	33.3	59,055	41	54,490	23.6	4,565	2
Endura	101	43.2	56,173	39	50,359	21.8	5,814	2.5
Topsin broadcast	47	20.1	45,879	31.9	39,097	16.9	6,782	2.9
None	39	16.7	16,391	11.4	---	---	---	---
Priaxor	20	8.5	12,957	9	11,737	5.1	1,220	0.5
Tebuzol	11	4.7	7,775	5.4	7,775	3.4	0	0
Omega	3	1.3	7,060	4.9	7,060	3.1	0	0
Proline broadcast	9	3.8	6,757	4.7	6,757	2.9	0	0
ProPulse	5	2.1	5,800	4	5,800	2.5	0	0
Folicur	3	1.3	5,150	3.6	5,150	2.2	0	0
Headline	6	2.6	4,441	3.1	4,441	1.9	0	0
Badge	5	2.1	2,275	1.6	2,175	0.9	100	0
Incognito	5	2.1	1,940	1.3	1,940	0.8	0	0
Calcium	1	0.4	1,690	1.2	1,690	0.7	0	0
Onset	3	1.3	1,565	1.1	1,565	0.7	0	0
Switch	1	0.4	1,500	1	1,500	0.6	0	0
Tebucure	2	0.9	1,360	0.9	1,360	0.6	0	0
Oxidate	4	1.7	1,340	0.9	512	0.2	828	0.4
Praiz	2	0.9	1,200	0.8	1,000	0.4	200	0.1
Miravis Neo	2	0.9	1,186	0.8	1,186	0.5	0	0
Topsin banded	2	0.9	1,015	0.7	1,015	0.4	0	0
Aproach	1	0.4	1,000	0.7	1,000	0.4	0	0

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]
Quadris/Amstar	1	0.4	815	0.6	815	0.4	0	0
Proline banded	1	0.4	800	0.6	800	0.3	0	0
Orius	1	0.4	700	0.5	700	0.3	0	0
Delaro	1	0.4	600	0.4	600	0.3	0	0
Equation	1	0.4	500	0.3	500	0.2	0	0
Champ	4	1.7	433	0.3	233	0.1	200	0.1
Arius ADV	1	0.4	250	0.2	250	0.1	0	0
Sanidate	1	0.4	160	0.1	160	0.1	0	0
Fungicide Total			**231,376**		**211,667**	**91.5**	**19,709**	**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.

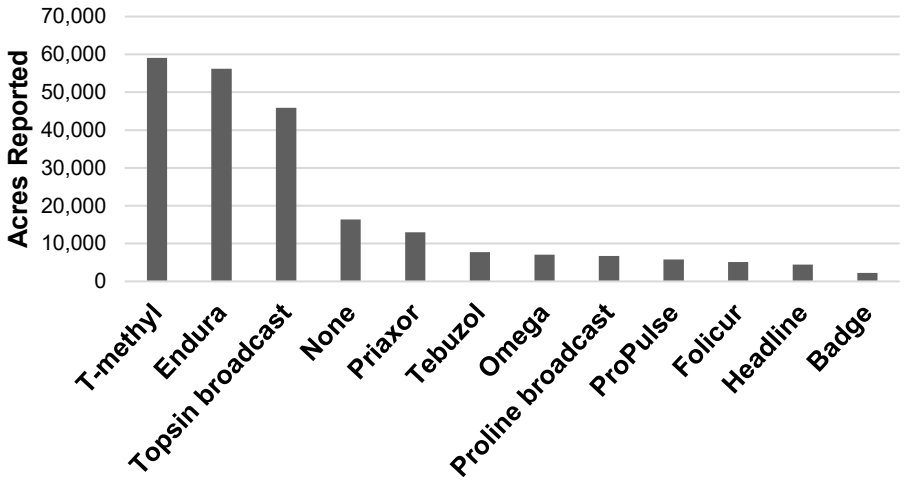

Figure 23. Northarvest foliar fungicide use in dry beans in 2020 (10 most frequently used products only).

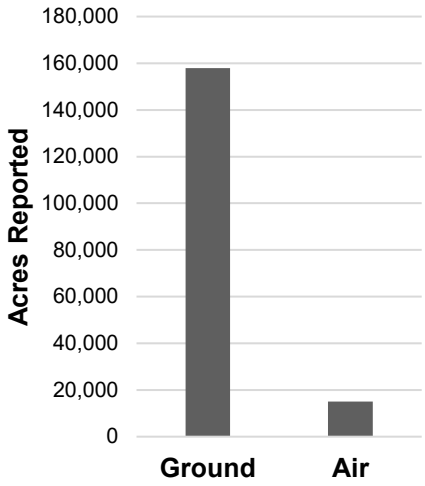

Figure 24. Northarvest fungicide application method in dry beans in 2020.

Table 38. In-furrow fungicide use in dry beans in 2020.

Fungicide	Respondents (no.)	Respondents (%)	Total acres treated (no.)[a]	Total acres treated (%)[a]
Minnesota				
None	76	91.6	36,059	84.6
Xanthion	4	4.8	3,253	7.6
Headline	3	3.6	2,686	6.3
Azteroid	2	2.4	621	1.5
Fungicide Total			**6,560**	**15.4**
North Dakota				
None	138	100	94,661	99.7
Azteroid	1	0.7	300	0.3
Fungicide Total			**300**	**0.3**
Northarvest				
None	214	96.8	130,720	95
Xanthion	4	1.8	3,253	2.4
Headline	3	1.4	2,686	2
Azteroid	3	1.4	921	0.7
Fungicide Total			**6,860**	**5**

[a]Respondents' acres only.

Table 39. Fungicide seed treatment use in dry beans in 2020.

Seed treatment	Respondents (no.)	Respondents (%)[b]	Total acres treated (no.)[a]	Total acres treated (%)[a,b]
Minnesota				
Cruiser Maxx	48	55.8	25,378	60.3
Apron Maxx	15	17.4	11,347	27
Rancona	13	15.1	8,103	19.3
Apron, Apron XL	13	15.1	7,802	18.5
Maxim	9	10.5	7,255	17.2
Vibrance	10	11.6	7,173	17
None	20	23.3	6,352	15.1
Cruiser Maxx Vibrance	6	7	2,958	7
Heads Up	7	8.1	2,649	6.3
Dynasty	2	2.3	1,920	4.6
Vibrance Maxx	6	7	1,827	4.3
Vitavax	1	1.2	1,800	4.3
Captan	1	1.2	815	1.9
Stamina	1	1.2	800	1.9
Don't know	3	3.5	497	1.2
Rancona Summit	1	1.2	386	0.9
Belmont	1	1.2	150	0.4
Spirato	1	1.2	150	0.4
Seed Treatment Total			**81,010**	
North Dakota				
Cruiser Maxx	50	35.7	34,187	34.7
None	44	31.4	30,319	30.8
Apron, Apron XL	15	10.7	13,317	13.5
Apron Maxx	16	11.4	10,227	10.4
Cruiser Maxx Vibrance	15	10.7	9,604	9.8
Rancona	12	8.6	8,097	8.2
Maxim	11	7.9	7,365	7.5
Don't know	12	8.6	6,377	6.5
Heads Up	7	5	4,265	4.3
Vibrance	6	4.3	3,568	3.6
Vibrance Maxx	6	4.3	3,375	3.4
Dynasty	2	1.4	1,250	1.3
Thiram	1	0.7	1,000	1
Stamina	1	0.7	900	0.9
Belmont	1	0.7	500	0.5
Rancona Summit	1	0.7	340	0.3
Vitavax	1	0.7	223	0.2
Captan	1	0.7	75	0.1
Seed Treatment Total			**104,670**	
Northarvest				
Cruiser Maxx	98	43.4	59,565	42.4
None	64	28.3	36,671	26.1
Apron Maxx	31	13.7	21,574	15.4
Apron, Apron XL	28	12.4	21,119	15
Rancona	25	11.1	16,200	11.5
Maxim	20	8.8	14,620	10.4
Cruiser Maxx Vibrance	21	9.3	12,562	8.9
Vibrance	16	7.1	10,741	7.6
Heads Up	14	6.2	6,914	4.9
Don't know	15	6.6	6,874	4.9
Vibrance Maxx	12	5.3	5,202	3.7
Dynasty	4	1.8	3,170	2.3
Vitavax	2	0.9	2,023	1.4
Stamina	2	0.9	1,700	1.2
Thiram	1	0.4	1,000	0.7
Captan	2	0.9	890	0.6
Rancona Summit	2	0.9	726	0.5
Belmont	2	0.9	650	0.5
Spirato	1	0.4	150	0.1
Seed Treatment Total			**185,680**	

[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.

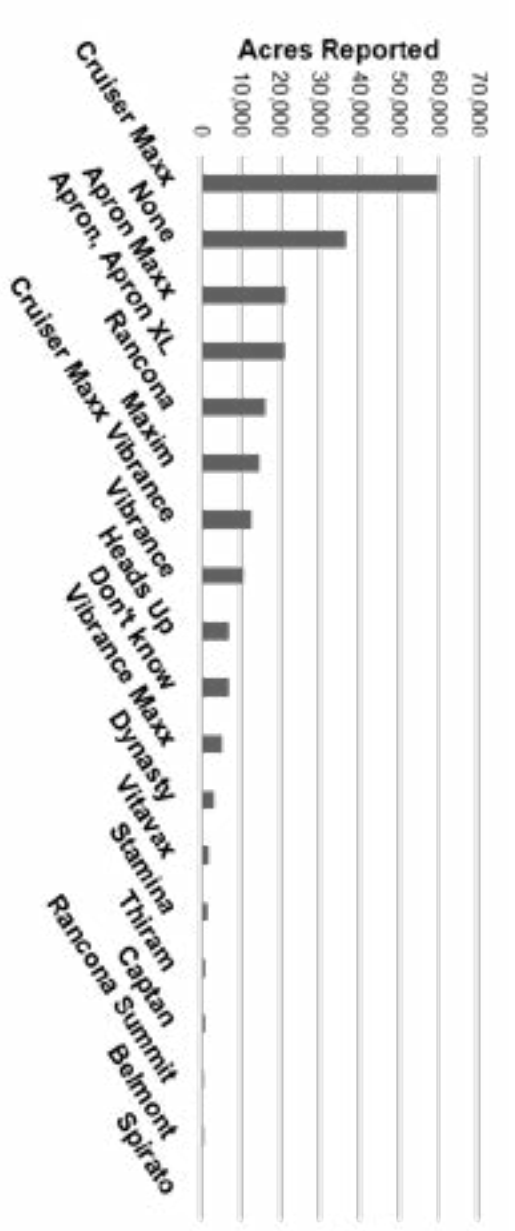

Figure 25. Northarvest fungicide seed treatment use in dry beans in 2020.

Weeds and Herbicide Use

Table 40. Worst weed problem in dry beans in 2020.

Weed[a]	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[b,c]	Acres reported (%)[b,c]
Minnesota				
Lambsquarters	19	21.1	13,471	29
Waterhemp	37	41.1	12,363	26.6
Ragweed	18	20	10,809	23.2
Nightshade	5	5.6	4,730	10.2
Redroot pigweed	3	3.3	2,400	5.2
Kochia	2	2.2	1,160	2.5
Cocklebur	2	2.2	907	1.9
Campion (white cockle)	1	1.1	200	0.4
Clover	1	1.1	200	0.4
Foxtail	1	1.1	169	0.4
Wild buckwheat	1	1.1	115	0.2
Total	**90**	**100**	**46,524**	**100**
North Dakota				
Kochia	45	31.5	32,200	32.3
Ragweed	22	15.4	16,971	17
Lambsquarters	15	10.5	11,894	11.9
Foxtail	3	2.1	5,502	5.5
Redroot pigweed	8	5.6	4,597	4.6
Volunteer grain	7	4.9	3,981	4
Biennial wormwood	5	3.5	3,970	4
Marestail	8	5.6	3,696	3.7
Nightshade	3	2.1	3,115	3.1
Waterhemp	6	4.2	2,395	2.4
Wild mustard	7	4.9	2,374	2.4
Cocklebur	2	1.4	2,210	2.2
Sunflower	1	0.7	1,600	1.6
Wild oat	3	2.1	1,307	1.3
Curly dock	1	0.7	1,100	1.1
Wild buckwheat	4	2.8	1,086	1.1
Canada thistle	2	1.4	1,005	1
Lanceleaf sage	1	0.7	772	0.8
Total	**143**	**100**	**99,775**	**100**
Northarvest				
Kochia	47	20.2	33,360	22.8
Ragweed	40	17.2	27,780	19
Lambsquarters	34	14.6	25,365	17.3
Waterhemp	43	18.5	14,758	10.1
Nightshade	8	3.4	7,845	5.4
Redroot pigweed	11	4.7	6,997	4.8
Foxtail	4	1.7	5,671	3.9
Volunteer grain	7	3	3,981	2.7
Biennial wormwood	5	2.1	3,970	2.7
Marestail	8	3.4	3,696	2.5
Cocklebur	4	1.7	3,117	2.1
Wild mustard	7	3	2,374	1.6
Sunflower	1	0.4	1,600	1.1
Wild oat	3	1.3	1,307	0.9
Wild buckwheat	5	2.1	1,201	0.8
Curly dock	1	0.4	1,100	0.8
Canada thistle	2	0.9	1,005	0.7
Lanceleaf sage	1	0.4	772	0.5
Campion (white cockle)	1	0.4	200	0.1
Clover	1	0.4	200	0.1
Total	**233**	**100**	**146,299**	**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.

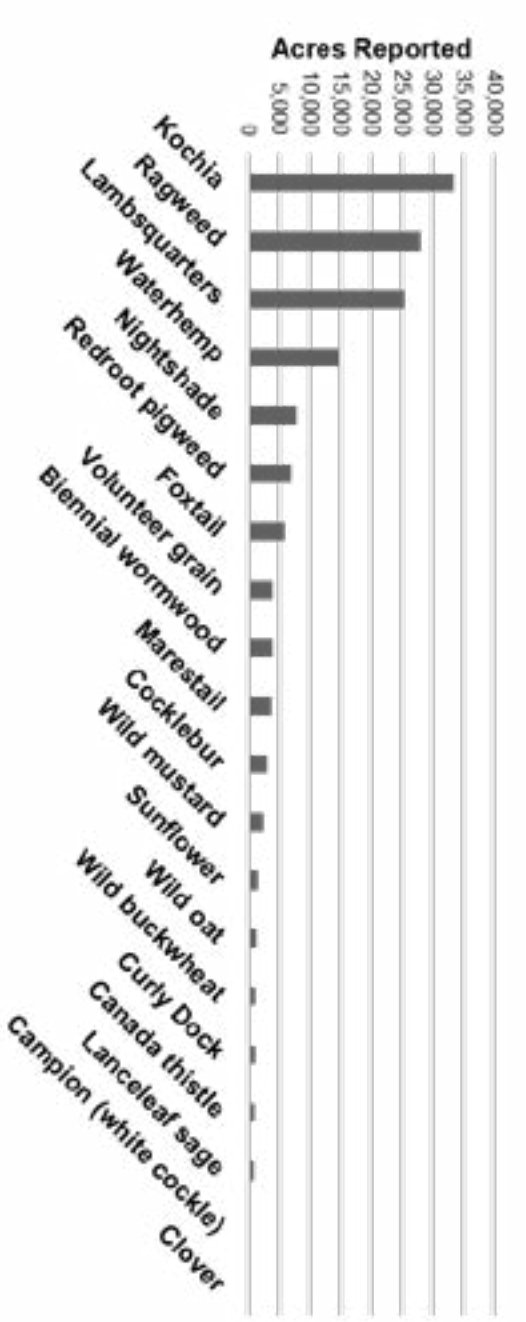

Figure 26. Northarvest worst weed problem in dry beans in 2020.

Table 41. Weeds ranked as one of the three worst in dry beans in 2020.

Weed[a]	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[b]	Acres reported (%)[b]
Minnesota				
Lambsquarters	62	68.9	31,981	68.7
Waterhemp	49	54.4	22,942	49.3
Ragweed	46	51.1	22,807	49
Red. pigweed	26	28.9	15,464	33.2
Nightshade	15	16.7	8,496	18.3
Kochia	6	6.7	5,851	12.6
Buckwheat	5	5.6	4,595	9.9
Cocklebur	7	7.8	4,091	8.8
Vol. grain	7	7.8	3,998	8.6
Pros. pigweed	5	5.6	3,724	8
Bi. wormwood	6	6.7	3,276	7
Foxtail	5	5.6	3,257	7
Wild mustard	2	2.2	1,249	2.7
Canada thistle	3	3.3	992	2.1
Venice mallow	3	3.3	721	1.5
Smartweed	2	2.2	480	1
Proso millet	1	1.1	323	0.7
Wild oats	1	1.1	320	0.7
Lance. sage	1	1.1	304	0.7
White cockle	2	2.2	275	0.6
Clover	1	1.1	200	0.4
Sunflowers	1	1.1	150	0.3
North Dakota				
Kochia	81	56.6	59,619	59.8
Lambsquarters	48	33.6	32,719	32.8
Red. pigweed	52	36.4	32,521	32.6
Ragweed	38	26.6	29,339	29.4
Cocklebur	20	14	16,970	17
Nightshade	17	11.9	15,368	15.4
Vol. grain	24	16.8	14,631	14.7
Canada thistle	20	14	14,235	14.3
Bi. wormwood	20	14	13,884	13.9
Marestail	21	14.7	11,879	11.9
Wild oats	13	9.1	9,366	9.4
Foxtail	8	5.6	8,712	8.7
Wild mustard	14	9.8	6,003	6
Waterhemp	13	9.1	5,582	5.6
Buckwheat	10	7	5,116	5.1
Sunflowers	3	2.1	3,326	3.3
Lance. sage	3	2.1	3,222	3.2
Pro. pigweed	2	1.4	2,900	2.9
Vol. canola	3	2.1	2,896	2.9
Black medic	2	1.4	1,460	1.5
Venice mallow	1	0.7	1,300	1.3
Curly dock	1	0.7	1,100	1.1
Chamomile	1	0.7	311	0.3
Stinkgrass	1	0.7	120	0.1
Northarvest				
Kochia	87	37.3	65,470	44.8
Lambsquarters	110	47.2	64,700	44.2
Ragweed	84	36.1	52,146	35.6
Red. pigweed	78	33.5	47,985	32.8
Waterhemp	62	26.6	28,524	19.5
Nightshade	32	13.7	23,864	16.3
Cocklebur	27	11.6	21,061	14.4
Vol. grain	31	13.3	18,629	12.7
Bi. wormwood	26	11.2	17,160	11.7
Canada thistle	23	9.9	15,227	10.4
Foxtail	13	5.6	11,969	8.2
Marestail	21	9	11,879	8.1
Buckwheat	15	6.4	9,711	6.6
Wild oats	14	6	9,686	6.6
Wild mustard	16	6.9	7,252	5
Pro. pigweed	7	3	6,624	4.5
Lance. sage	4	1.7	3,526	2.4
Sunflowers	4	1.7	3,476	2.4
Vol. canola	3	1.3	2,896	2
Venice mallow	4	1.7	2,021	1.4
Black medic	2	0.9	1,460	1
Curly dock	1	0.4	1,100	0.8
Smartweed	2	0.9	480	0.3
Proso millet	1	0.4	323	0.2
Chamomile	1	0.4	311	0.2
White cockle	2	0.9	275	0.2
Clover	1	0.4	200	0.1
Stinkgrass	1	0.4	120	0.1

[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.

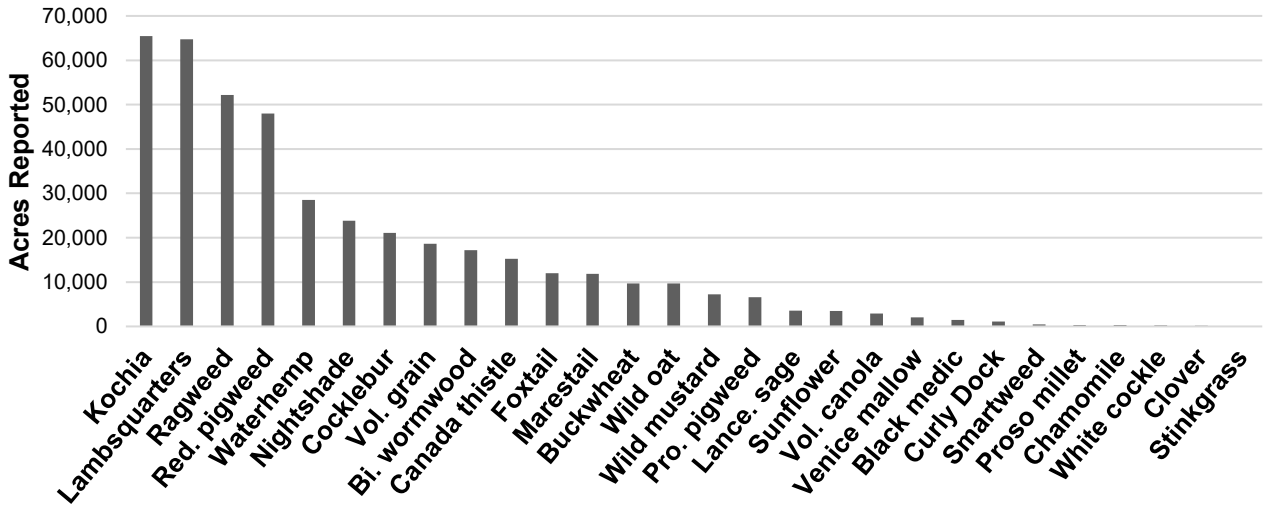

Figure 27. Northarvest weeds ranked as one of the three worst in dry beans in 2020.

Table 42. Weed control practices used in dry beans in 2020.

Herbicide or other practice	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[a]	Acres reported (%)[b]
Minnesota				
Raptor	52	57.8	32,755	70.5
Basagran/generics	60	66.7	31,879	68.6
Reflex	54	60	29,206	62.9
Select/generics	31	34.4	18,367	39.5
Outlook	24	26.7	15,711	33.8
Sonalan	24	26.7	15,250	32.8
Eptam	22	24.4	12,559	27
Trifluralin	21	23.3	9,294	20
Dual/generics	20	22.2	8,647	18.6
Permit	17	18.9	8,627	18.6
Prowl	21	23.3	8,406	18.1
Varisto	19	21.1	8,234	17.7
Assure	9	10	5,385	11.6
Fusilade DX	11	12.2	3,484	7.5
Poast	5	5.6	2,217	4.8
NDSU Micro-rate	2	2.2	2,166	4.7
Glyph.preplant	4	4.4	1,043	2.2
Pursuit	4	4.4	645	1.4
Spartan/Charge	3	3.3	483	1
BroadAxe	1	1.1	450	1
Herbicide Total			**214,808**	
Cultivation	23	25.6	15,530	33.4
Cover crop	9	10	4,563	9.8
Rotary hoe	5	5.6	3,368	7.3
Manual labor	13	14.4	1,783	3.8
Nonherbicide Total			**25,244**	
Weed Control Total			**240,052**	
Basagran/generics	92	63.9	70,216	70.2
Reflex	86	59.7	58,786	58.8
Select/generics	70	48.6	54,096	54.1
Raptor	64	44.4	47,496	47.5
Sonalan	51	35.4	34,571	34.6
Spartan/Charge	42	29.2	33,273	33.3
Varisto	55	38.2	32,296	32.3
Glyph. preplant	36	25	26,322	26.3
Prowl	20	13.9	18,025	18
BroadAxe	20	13.9	14,720	14.7
Dual/generics	13	9	13,143	13.1
Assure	16	11.1	10,504	10.5
NDSU Micro-rate	8	5.6	9,018	9
Trifluralin	12	8.3	8,389	8.4
Outlook	10	6.9	6,571	6.6
Permit	14	9.7	5,978	6
Glyph. postharvest	4	2.8	5,570	5.6
Poast	8	5.6	3,983	4
Pursuit	8	5.6	3,655	3.7
Spartan Elite	5	3.5	2,850	2.9
Eptam	5	3.5	2,524	2.5
2,4-D preplant	3	2.1	1,787	1.8
Herbicide Total			**463,773**	
Cultivation	26	18.1	23,140	23.1
Cover crop	9	6.3	8,845	8.8
Rotary hoe	6	4.2	3,788	3.8
Manual labor	5	3.5	1,091	1.1
Nonherbicide Total			**36,864**	
Weed Control Total			**500,637**	

Herbicide or other practice	Respon-dents (no.)	Respon-dents (%)	Acres reported (no.)[a]	Acres reported (%)[b]
Northarvest				
Basagran/generics	152	65	102,095	69.7
Reflex	140	59.8	87,992	60.1
Raptor	116	49.6	80,251	54.8
Select/generics	101	43.2	72,463	49.5
Sonalan	75	32.1	49,821	34
Varisto	74	31.6	40,530	27.7
Spartan/Charge	45	19.2	33,756	23
Glyph. preplant	40	17.1	27,365	18.7
Prowl	41	17.5	26,431	18
Outlook	34	14.5	22,282	15.2
Dual/generics	33	14.1	21,790	14.9
Trifluralin	33	14.1	17,683	12.1
Assure	25	10.7	15,889	10.8
BroadAxe	21	9	15,170	10.4
Eptam	27	11.5	15,083	10.3
Permit	31	13.2	14,605	10
NDSU Micro-rate	10	4.3	11,184	7.6
Poast	13	5.6	6,200	4.2
Glyph. postharvest	4	1.7	5,570	3.8
Pursuit	12	5.1	4,300	2.9
Fusilade DX	11	4.7	3,484	2.4
Spartan Elite	5	2.1	2,850	1.9
2,4-D preplant	3	1.3	1,787	1.2
Herbicide Total			**678,581**	
Cultivation	49	20.9	38,670	26.4
Cover crop	18	7.7	13,408	9.2
Rotary hoe	11	4.7	7,156	4.9
Manual labor	18	7.7	2,874	2
Nonherbicide Total			**62,108**	
Weed Control Total			**740,689**	

[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.

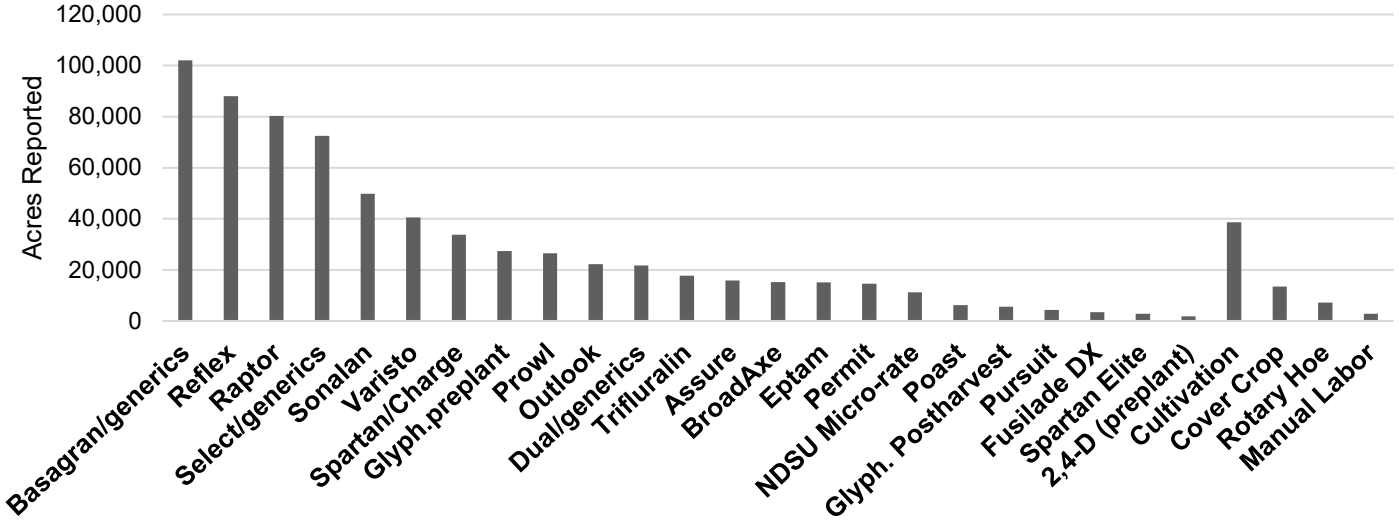

Figure 28. Northarvest weed control practices used in dry beans in 2020.

Scouting and Threshold Practices

Table 43. Scouting practices in dry beans in 2020.

	Insects		Diseases		Weeds	
Minnesota	**Respon-dents (no.)**	**Respon-dents (%)**	**Respon-dents (no.)**	**Respon-dents (%)**	**Respon-dents (no.)**	**Respon-dents (%)**
Crop consultant	40	44.4	41	45.6	39	43.8
Grower	39	43.3	37	41.1	43	48.3
Both	9	10	9	10	7	7.9
Don't scout	2	2.2	3	3.3	0	0
Total	**90**	**100**	**90**	**100**	**89**	**100**
North Dakota						
Crop consultant	74	51.4	75	52.1	70	49.3
Grower	60	41.7	58	40.3	59	41.5
Both	7	4.9	10	6.9	12	8.5
Don't scout	3	2.1	1	0.7	1	0.7
Total	**144**	**100**	**144**	**100**	**142**	**100**
Northarvest						
Crop consultant	114	48.7	116	49.6	109	47.2
Grower	99	42.3	95	40.6	102	44.2
Both	16	6.8	19	8.1	19	8.2
Don't scout	5	2.1	4	1.7	1	0.4
Total	**234**	**100**	**234**	**100**	**231**	**100**

Table 44. Use of economic thresholds for insects in dry beans in 2020.

	Respondents (no.)	Respondents (%)
Minnesota		
Economic thresholds used	86	95.6
Economic thresholds not used	4	4.4
Total	**90**	**100**
North Dakota		
Economic thresholds used	140	97.2
Economic thresholds not used	2	1.4
Economic thresholds sometimes used	2	1.4
Total	**144**	**100**
Northarvest		
Economic thresholds used	226	96.6
Economic thresholds not used	6	2.6
Economic thresholds sometimes used	2	0.9
Total	**234**	**100**

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Appendix I.

PLEASE COMPLETE ALL REQUESTED INFORMATION IN THE FOLLOWING TABLES FOR YOUR 2020 DRY BEAN CROP

State	County	Acres
Minnesota	1.	
	2.	
	3.	
North Dakota	1.	
	2.	
	3.	

Dry Bean Production in 2020	Acres
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 2020		
Bean Class	**Variety**	**Acres**
Black	Black Bear	
	Blackbeard	
	Black Cat	
	Blacktail	
	Eclipse	
	ND Twilight	
	Zenith	
	Zorro	
	Other black (please specify)	
Cranberry	Etna	
	Other cranberry (please specify)	
Great Northern	Aries	
	Draco	
	ND Pegasus	
	Powderhorn	
	Taurus	
	Other GN (please specify)	
Kidney	Beluga	
	Big Red	
	Cabernet	
	California Early LRK	
	Chaparral	
	Clouseau	
	Dynasty	
	Epic	
	Foxfire	
	Montcalm	
	ND Whitetail	
	Pink Panther	
	Rampart	
	Red Hawk	
	Red Rover	
	Ronnie's Red	
	Rosie	
	Talon	
	Other kidney (please specify)	
Navy	Alpena	
	Blizzard	
	Ensign	
	Medalist	
	Merlin	
	Norstar	
	T-9905	
	Other navy (please specify)	
Pink	Floyd	
	Magnolia	
	Rosetta	
	Sedona	
	Other pink (please specify)	
Pinto	Buster	
	Cowboy	
	Gleam (SD)*	
	La Paz	
	Lariat	
	Lumen (SD)*	
	Maverick	
	Monterrey	
	ND 307	
	ND Falcon	
	ND Palomino (SD)*	
	Radiant (SD)*	
	Rough Rider	
	Santa Cruz	
	Sinaloa	
	Sonora	
	Stampede	
	Staybright (SD)*	
	Torreon	
	Vibrant (SD)*	
	Windbreaker	
	Other pinto (please specify)	
Small Red	Caldera	
	Merlot	
	Viper	
	Ruby	
	Other red (please specify)	
Other Class	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 2020. 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)			
Planting rate (seeds per acre)			
Delayed planting			
Diseases			
Drought			
Emergence/stand			
Frost damage			
Percent yield reduction due to frost damage	%	%	%
Hail damage			
Harvest			
Insects			
Micronutrient deficiency			
Soil salinity			
Water damage (beans harvested)			
Water damage (beans NOT harvested)			
Weeds			
Wind damage			
Other problem (please specify)			

Agronomy

Please list row spacing, seeding rate and established stand for each bean class you planted in 2020.			
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 2020?		
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 2020.	
Year	**List of Crops**
2019	
2018	
2017	
2016	

Please list acreage for each tillage type listed below for your dry bean fields in 2020.			
Tillage Type	**Acreage**	**Tillage Type**	**Acreage**
Conventional		Strip-till	
Minimum		No-till	

Cover Crops in Dry Beans in 2020. Please answer the questions in the table below.
Did you use a cover crop on your dry bean ground in 2020? **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) Moisture conservation Soil conservation Weed control Other _____

Did you use a ground roller on your dry bean ground in 2020?			
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 2020 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 2020? Please 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 2020?

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 the new 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)

Low Price
High Price
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 performance of SD varieties
Other:

Insecticides and Insect Pests

Foliar Insecticides Used on Dry Beans in 2020.
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 2020.
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	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 2020. 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 2020. 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 2020. 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	20. Mastercop	39. Quash
2. Aproach	21. Meteor	40. Quilt
3. Aprovia Top	22. Microthiol	41. Rovral
4. Arius Adv	23. Miravis Neo	42. Sanidate
5. AZteroid	24. Miravis Top	43. Satori
6. Badge	25. Monsoon	44. Serenade
7. Basicop	26. Nevado	45. Switch
8. Bravo	27. Omega	46. Tebucure
9. Cannonball	28. Onset	47. Tebuzol
10. Cercobin	29. Orius	48. Tetraban
11. Champ	30. Oxidate	49. T-methyl
12. Cuprofix	31. Oxiphos	50. Topsin
13. Echo	32. Praiz	51. Vabro
14. Endura	33. Priaxor	52. Veltyma
15. Equation	34. Proline	53. Vertisan
16. Evito	35. ProPulse	54. Viathon
17. Headline	36. Provysol	55. None used
18. Incognito	37. Quadris	56. Other (specify)
19. Kocide	38. Quadris Opti	

In-furrow Fungicide Applications Made on Dry Beans in 2020. 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 2020. 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. Spirato
2. Apron Maxx	13. Maxim	24. Stamina
3. Apron XL	14. Mertect	25. Thiram
4. Belmont	15. Obvious	26. Vibrance
5. Captan	16. Obvious Plus	27. Vibrance Maxx
6. Chloroneb	17. Prevail	28. Vitaflo
7. Cruiser Maxx	18. Rancona	29. Vitavax
8. Cruiser Maxx Vibrance	19. Rancona Summit	30. None used
9. Dyna-Shield	20. Rizolex	31. Other (specify)
10. Dynasty	21. Sebring	
11. EverGol Energy	22. Signet	

Worst Disease Problem in Dry Beans in 2020. 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 2020. 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 2020. 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		Volunteer canola	
Horesweed (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 2020. 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 2020 Dry Bean Grower Survey!

Cover photos (top to bottom)

G. Endres, NDSU
dry edible bean field

P. Beauzay, NDSU
two-spotted spider mite

G. Endres, NDSU
seed of ND Palomino seed
(slow darkening pinto variety)

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For more information on this and other topics, see www.ag.ndsu.edu

1M-2-08; 600-12-08; 600-6-09; 400-4-10; 400-2-11; 300-2-12; 400-2-13; 300-3-14; 400-3-15; 400-3-16; 400-3-17; 400-4-18; 400-3-19; 500-4-20; 350-3-21; web-6-21