



E2088 (April 2023)

2022 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

Table of Contents

Introduction	4
Acknowledgments	4
Production	5
Table 1. Number of Northharvest dry bean growers responding, acres planted by respondents and total state acres in 2022.....	5
Table 2. Dry bean production by county in 2022.....	5
Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground, affected by drought, and damaged by water in 2022.....	6
Table 4. Dry bean market classes grown in 2022.....	6
Table 5. Dry bean varieties grown in 2022.....	7
Table 6. Dry bean production problems reported in 2022.....	8
Table 7. Row spacing by dry bean market class in 2022.....	9
Table 8. Seeding rate by dry bean market class in 2022.....	9
Table 9. Percent of total dry bean acres harvested by direct combining in 2022.....	10
Table 10. Estimated yield loss in harvested dry beans in 2022.....	10
Table 11. Dry bean field tillage practices in 2022.....	11
Agronomy	11
Table 12. Cover crop use on dry bean fields in 2022.....	11
Table 13. Reasons for cover crop use on dry bean fields in 2022.....	11
Table 14. Seasonal use of cover crops on dry bean fields in 2022.....	12
Table 15. Cover crop species composition on dry bean fields in 2022.....	12
Table 16. Use of fertilizers on dry bean fields in 2022.....	13
Table 17. Fertilizer application methods on dry bean fields in 2022.....	13
Table 18. Use of soil test prior to fertilization of dry bean fields in 2022.....	13
Table 19. Use of <i>Rhizobium</i> inoculants on dry bean fields in 2022.....	14
Table 20. Use of site-specific nutrient management (SSNM) on dry bean fields in 2022.....	14
Table 21. Desiccants used on dry beans in 2022.....	15
Table 22. Desiccant tank mixes used on dry beans in 2022.....	15
Table 23. Frequency of previous crops (2018-2021) in fields planted to dry beans in 2022.....	16
Table 24. Number of years dry beans are grown in dry bean crop rotation program.....	17
Insect Pests and Insecticide Use	18
Table 25. Worst insect problem in dry beans in 2022.....	18
Table 26. Insects ranked as one of the three worst in dry beans in 2022.....	19
Table 27. Foliar insecticide use in dry beans in 2022.....	20
Table 28. Seed treatment and soil insecticide use in dry beans in 2022.....	21
Plant Diseases and Fungicide Use	22
Table 29. Worst disease problem in dry beans in 2022.....	22
Table 30. Diseases ranked as one of the three worst in dry beans in 2022.....	23
Table 31. Foliar fungicide use in dry beans in 2022.....	24
Table 32. In-furrow fungicide use in dry beans in 2022.....	25
Table 33. Fungicide seed treatment use in dry beans in 2022.....	26
Weeds and Herbicide Use	27
Table 34. Worst weed problem in dry beans in 2022.....	27
Table 35. Weeds ranked as one of the three worst in dry beans in 2022.....	28
Table 36. Weed control practices used in dry beans in 2022.....	29
Scouting and Threshold Practices	30
Table 37. Scouting practices in dry beans in 2022.....	30
Table 38. Use of economic thresholds for insects in dry beans in 2022.....	30
References	31
Appendix I	34

List of Figures

- Figure 1. Northharvest dry bean acres planted by state in 2022..... 5
- Figure 2. Northharvest dry bean production by county in 2022 5
- Figure 3. Northharvest respondents’ reported acres from Table 3..... 6
- Figure 4. Northharvest dry bean market classes grown in 2022 6
- Figure 5. Northharvest percent of dry bean acres harvested by direct combining in 2022 10
- Figure 6. Northharvest estimated yield loss in harvested dry beans in 2022 10
- Figure 7. Northharvest dry bean field tillage practices in 2022 11
- Figure 8. Northharvest use of fertilizers on dry bean fields in 2022 13
- Figure 9. Northharvest fertilizer application methods on dry bean fields in 2022..... 13
- Figure 10. Northharvest use of soil test in 2022..... 13
- Figure 11. Northharvest use of inoculant in 2022 14
- Figure 12. Northharvest use of site-specific nutrient management in 2022 14
- Figure 13. Northharvest desiccants used on dry beans in 2022 15
- Figure 14. Northharvest number of years dry beans are grown in dry bean crop rotation program 17
- Figure 15. Northharvest worst insect problem in dry beans in 2022 18
- Figure 16. Northharvest insects ranked as one of the three worst in dry beans in 2022 19
- Figure 17. Northharvest foliar insecticide use in dry beans in 2022..... 20
- Figure 18. Northharvest insecticide seed treatment and soil insecticide use in dry beans in 2022 21
- Figure 19. Northharvest worst disease problem in dry beans in 2022 22
- Figure 20. Northharvest diseases ranked as one of the three worst in dry beans in 2022 23
- Figure 21. Northharvest foliar fungicide use in dry beans in 2022 25
- Figure 22. Northharvest fungicide seed treatment use in dry beans in 2022..... 26
- Figure 23. Northharvest worst weed problem in dry beans in 2022 27
- Figure 24. Northharvest weeds ranked as one of the three worst in dry beans in 2022 28
- Figure 25. Northharvest weed control practices used in dry beans in 2022 30

Introduction

The 2022 dry bean grower survey is the 33rd annual survey of varieties grown, pest problems, pesticide use and grower practices of the Northharvest 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 Northharvest Bean Growers Association developed the survey form (Appendix I). The survey was mailed to all Northharvest bean growers. All participants in the survey were anonymous.

Results of previous surveys dated 1987-1992, 1994-2000, 2002 and 2004-2021 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 Northharvest 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 Northharvest survey unless otherwise noted. Data reported in the tables are broken down by state and also are totaled for the entire Northharvest 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 Northharvest Bean Growers Association.

Acknowledgments

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



Cover photos (top to bottom):

Gregory Endres, NDSU – pinto beans emerging; Veronica Calles Torrez, NDSU – two-striped grasshopper; and Gregory Endres, NDSU – pinto bean field in Wells County, ND.

Production

Table 1. Number of Northharvest dry bean growers responding, acres planted by respondents and total state acres in 2022.

Growers	No. of respondents	Respondents' acres	Total acres ^a	Acres surveyed (% of total)
Minnesota	89	47,084	215,000	21.9
North Dakota	133	86,114	570,000	15.1
Northharvest	222	133,198	785,000	17

^aTotal of dry bean acres planted for Minnesota and North Dakota (source: USDA National Agricultural Statistics Service).

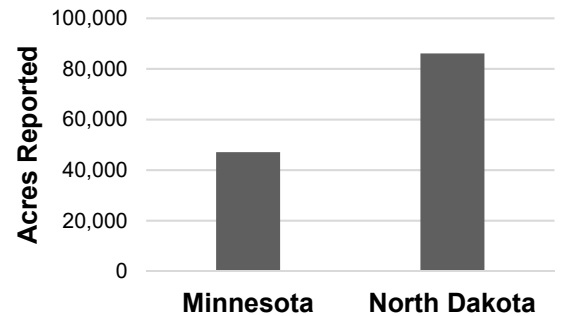


Figure 1. Northharvest dry bean acres planted by state in 2022 (respondents' acres only).

Table 2. Dry bean production by county in 2022.

Minnesota	No. of respondents ^a	Acres ^b	North Dakota	No. of respondents ^a	Acres ^b
Polk	15	8,916	Grand Forks	22	15,263
Otter Tail	7	5,136	Walsh	29	12,106
Mahnomen	7	4,218	Pembina	17	10,762
Hubbard	3	4,163	Traill	13	7,257
Swift	12	3,403	McLean	5	6,025
Norman	5	3,252	Benson	11	5,351
Stevens	9	2,881	Wells	7	5,237
Marshall	6	2,148	Stutsman	3	4,060
Wadena	3	2,011	Nelson	6	3,213
Benton	2	1,829	Cass	6	2,464
Red Lake	2	1,400	Steele	5	2,218
Chippewa	3	1,255	Ransom	4	2,042
Becker	2	1,170	Barnes	5	1,797
Kandiyohi	5	1,007	Ramsey	5	1,456
Renville	6	868	LaMoure	3	1,408
Douglas	1	540	Foster	2	1,050
Pope	2	502	Cavalier	2	995
Clay	2	440	Pierce	1	640
Faribault	1	325	Mercer	1	625
Morrison	1	310	Emmons	1	450
Lac Qui Parle	1	250	Dickey	1	400
Meeker	2	214	Richland	1	380
Redwood	1	163	McHenry	1	215
Big Stone	1	145	McIntosh	1	180
Crow Wing	1	140	Rolette	1	170
Stearns	2	130	Eddy	2	160
Dakota	1	125	Logan	1	110
Traverse	1	118	Sargent	1	80
Lyon	1	25			
Total		47,084	Total		86,114

^aSome respondents had dry bean acreage in more than one county.

^bRespondents' acres only.

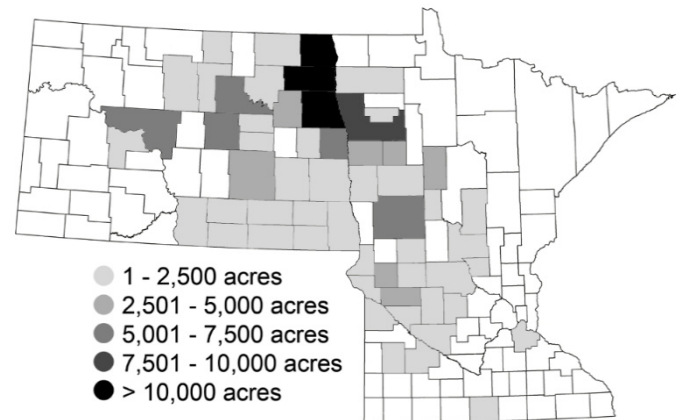


Figure 2. Northharvest dry bean production by county in 2022 (respondents' acres only).

Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground, affected by drought, and damaged by water in 2022.

	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Planted	47,084	100
Harvested	46,831	99.5
Irrigated	15,575	33.1
Tile-drained	10,531	22.4
Drought	8,618	18.3
Water damage (beans harvested)	748	1.6
Water damage (beans not harvested)	78	0.2
North Dakota		
Planted	86,114	100
Harvested	84,204	97.8
Irrigated	1,636	1.9
Tile-drained	4,953	5.8
Drought	19,378	22.5
Water damage (beans harvested)	2,520	2.9
Water damage (beans not harvested)	493	0.6
Northarvest		
Planted	133,198	100
Harvested	131,035	98.4
Irrigated	17,211	12.9
Tile-drained	15,484	11.6
Drought	27,996	21
Water damage (beans harvested)	3,268	2.5
Water damage (beans not harvested)	571	0.4

^aRespondents' acres only.

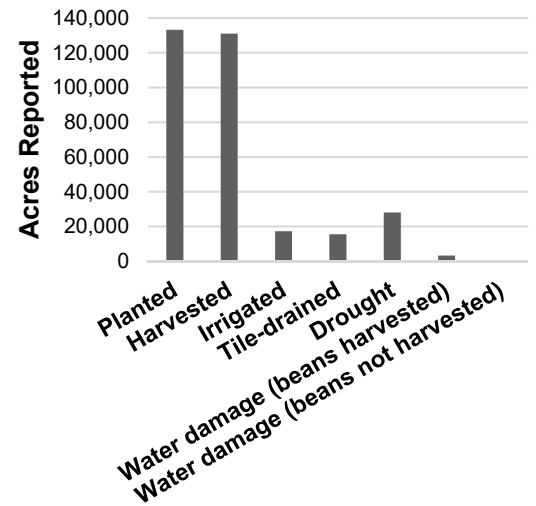


Figure 3. Northarvest respondents' reported acres from Table 3.

Table 4. Dry bean market classes grown in 2022.

Market class	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Kidney	17,254	36.6
Black	16,895	35.9
Navy	9,123	19.4
Pinto	2,933	6.2
Pink	645	1.4
Small Red	234	0.5
Total	47,084	100
North Dakota		
Pinto	63,946	74.3
Navy	10,100	11.7
Black	8,870	10.3
Small Red	1,406	1.6
Pink	685	0.8
Cranberry	557	0.6
Kidney	400	0.5
Great Northern	150	0.2
Total	86,114	100
Northarvest		
Pinto	66,879	50.2
Black	25,765	19.3
Navy	19,223	14.4
Kidney	17,654	13.3
Small Red	1,640	1.2
Pink	1,330	1
Cranberry	557	0.4
Great Northern	150	0.1
Total	133,198	100

^aRespondents' acres only.

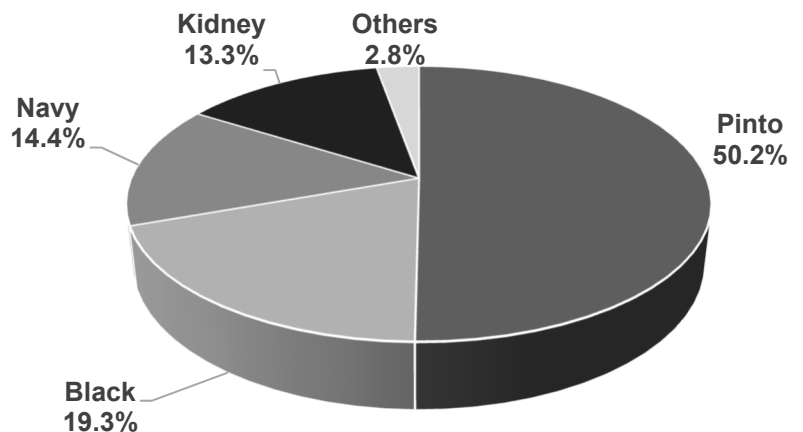


Figure 4. Northarvest dry bean market classes grown in 2022.

Table 5. Dry bean varieties grown in 2022.

Variety	Class	Minnesota ^a	% ^b	North Dakota ^a	% ^b	Northwest ^a	% ^b
Eclipse	Black	8,494	18	2,465	2.9	10,959	8.2
Black Tails	Black	3,271	6.9	4,998	5.8	8,269	6.2
Zorro	Black	1,406	3	0	0	1,406	1.1
Blackbeard	Black	567	1.2	401	0.5	968	0.7
Spectre	Black	933	2	0	0	933	0.7
Adams	Black	640	1.4	160	0.2	800	0.6
Ace	Black	400	0.8	250	0.3	650	0.5
Black Bear	Black	552	1.2	0	0	552	0.4
Zenith	Black	270	0.6	156	0.2	426	0.3
Black Cat	Black	150	0.3	220	0.3	370	0.3
Nimbus	Black	172	0.4	160	0.2	332	0.2
ND Twilight	Black	40	0.1	60	0.1	100	0.1
Total Black	Black	16,895	35.9	8,870	10.3	25,765	19.3
Etna	Cranberry	0	0	397	0.5	397	0.3
Vero	Cranberry	0	0	160	0.2	160	0.1
Total Cranberry	Cranberry	0	0	557	0.6	557	0.4
Draco	GN ^c	0	0	150	0.2	150	0.1
Total GN^c	GN^c	0	0	150	0.2	150	0.1
Clouseau	Kidney	4,875	10.4	0	0	4,875	3.7
Dynasty	Kidney	4,061	8.6	400	0.5	4,461	3.3
Montcalm	Kidney	2,186	4.6	0	0	2,186	1.6
Pink Panther	Kidney	1,805	3.8	0	0	1,805	1.4
Cabernet	Kidney	1,016	2.2	0	0	1,016	0.8
Red Rover	Kidney	905	1.9	0	0	905	0.7
Beluga	Kidney	880	1.9	0	0	880	0.7
Red Hawk	Kidney	706	1.5	0	0	706	0.5
Rosie	Kidney	165	0.4	0	0	165	0.1
Chaparral	Kidney	140	0.3	0	0	140	0.1
ND Whitetail	Kidney	140	0.3	0	0	140	0.1
Talon	Kidney	140	0.3	0	0	140	0.1
Epic	Kidney	110	0.2	0	0	110	0.1
Rampart	Kidney	100	0.2	0	0	100	0.1
Spire	Kidney	25	0.1	0	0	25	0
Total Kidney	Kidney	17,254	36.6	400	0.5	17,654	13.3
HMS Medalist	Navy	3,393	7.2	6,337	7.4	9,730	7.3
T-9905	Navy	3,873	8.2	2,741	3.2	6,614	5
Armada	Navy	915	1.9	750	0.9	1,665	1.3
Blizzard	Navy	455	1	272	0.3	727	0.5
HMS Bounty	Navy	245	0.5	0	0	245	0.2
Alpena	Navy	242	0.5	0	0	242	0.2
Total Navy	Navy	9,123	19.4	10,100	11.7	19,223	14.4
Magnolia	Pink	455	1	685	0.8	1,140	0.9
Floyd	Pink	190	0.4	0	0	190	0.1
Total Pink	Pink	645	1.4	685	0.8	1,330	1
Torreón	Pinto	465	1	13,735	15.9	14,200	10.7
Monterrey	Pinto	1,115	2.4	11,194	13	12,309	9.2
Vibrant (SD) ^d	Pinto	250	0.5	10,454	12.1	10,704	8
La Paz	Pinto	0	0	8,918	10.4	8,918	6.7
Windbreaker	Pinto	0	0	5,770	6.7	5,770	4.3
Cowboy	Pinto	100	0.2	4,728	5.5	4,828	3.6
Radiant (SD) ^d	Pinto	378	0.8	1,505	1.7	1,883	1.4
ND 307	Pinto	0	0	1,875	2.2	1,875	1.4
Gleam (SD) ^d	Pinto	625	1.3	912	1.1	1,537	1.2
SV6139GR	Pinto	0	0	1,375	1.6	1,375	1
ND Palomino (SD) ^d	Pinto	0	0	916	1.1	916	0.7
ND Falcon	Pinto	0	0	610	0.7	610	0.5
Cancun	Pinto	0	0	450	0.5	450	0.3
Lariat	Pinto	0	0	388	0.5	388	0.3
Maverick	Pinto	0	0	300	0.3	300	0.2
Santa Cruz	Pinto	0	0	250	0.3	250	0.2
Sinaloa	Pinto	0	0	200	0.2	200	0.2
USDA Rattler	Pinto	0	0	200	0.2	200	0.2
Rough Rider	Pinto	0	0	100	0.1	100	0.1
Mystic (SD) ^d	Pinto	0	0	66	0.1	66	0
Total Pinto	Pinto	2,933	6.2	63,946	74.3	66,879	50.2
Ruby	Small Red	0	0	1,013	1.2	1,013	0.8
Viper	Small Red	0	0	393	0.5	393	0.3
Cayenne	Small Red	234	0.5	0	0	234	0.2
Total Small Red	Small Red	234	0.5	1,406	1.6	1,640	1.2
Grand Total	All Classes	47,084	100	86,114	100	133,198	100

^aRespondents' acres only. ^bPercent of respondents' total dry bean acreage. ^cGN = Great Northern. ^d(SD) = Slow darkening pinto

Table 6. Dry bean production problems reported in 2022.

Production problem	Respondents (no.)	Respondents (%)	Acres reported (no.)^a	Acres reported (%)^a
Minnesota				
Drought (average reported yield loss = 24.5%)	31	35.6	8,618	18.8
Delayed planting	12	13.8	6,205	13.5
Diseases	17	19.5	4,820	10.5
Weeds	20	23	3,447	7.5
Wind	17	19.5	3,030	6.6
Hail	13	14.9	2,715	5.9
Emergence/stand	8	9.2	1,701	3.7
Harvest problems	5	5.7	1,564	3.4
Water damage (beans harvested)	10	11.5	748	1.6
Insects	2	2.3	648	1.4
Micronutrient deficiency	3	3.4	523	1.1
Herbicide carryover injury	2	2.3	300	0.7
Soil salinity	2	2.3	288	0.6
Seeding problems	1	1.1	278	0.6
Wildlife damage	8	9.2	130	0.3
Water damage (beans not harvested)	5	5.7	78	0.2
Herbicide drift injury	3	3.4	50	0.1
North Dakota				
Drought (average reported yield loss = 20.3%)	46	35.9	21,680	26.3
Wind	42	32.8	10,817	13.1
Weeds	40	31.3	10,105	12.2
Emergence/stand	23	18	5,233	6.3
Hail	22	17.2	4,848	5.9
Diseases	17	13.3	3,904	4.7
Insects	7	5.5	3,330	4
Soil salinity	33	25.8	2,714	3.3
Water damage (beans harvested)	17	13.3	2,520	3.1
Seeding problems	10	7.8	2,456	3
Harvest problems	5	3.9	1,255	1.5
Applied herbicide injury	6	4.7	1,171	1.4
Herbicide drift injury	3	2.3	1,045	1.3
Water damage (beans not harvested)	15	11.7	493	0.6
Wildlife damage	7	5.5	427	0.5
Spring frost	2	1.6	230	0.3
Fall frost	3	2.3	155	0.2
Herbicide carryover injury	1	0.8	15	0
Northarvest				
Drought (average reported yield loss = 22.1%)	70	32.6	27,996	21.8
Delayed planting	58	27	27,885	21.7
Wind	59	27.4	13,847	10.8
Weeds	60	27.9	13,552	10.6
Diseases	34	15.8	8,724	6.8
Hail	35	16.3	7,563	5.9
Emergence/stand	31	14.4	6,934	5.4
Insects	9	4.2	3,978	3.1
Water damage (beans harvested)	27	12.6	3,268	2.5
Soil salinity	35	16.3	3,002	2.3
Harvest problems	10	4.7	2,819	2.2
Seeding problems	11	5.1	2,734	2.1
Applied herbicide injury	6	2.8	1,171	0.9
Herbicide drift injury	6	2.8	1,095	0.9
Water damage (beans not harvested)	20	9.3	571	0.4
Wildlife damage	15	7	557	0.4
Micronutrient deficiency	3	1.4	523	0.4
Herbicide carryover injury	3	1.4	315	0.2
Spring frost	2	0.9	230	0.2
Fall frost	3	1.4	155	0.1

^aRespondents' acres only.

Table 7. Row spacing by dry bean market class in 2022.

Row spacing	Black ^a		Cranberry		Great Northern		Kidney		Navy ^a		Pink		Pinto ^a		Small Red	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Minnesota																
< 11 inches	1	2.4	0	0	0	0	0	0	0	0	1	50	0	0	0	0
11 to 15 inches	2	4.8	0	0	0	0	0	0	2	6.5	0	0	0	0	0	0
16 to 20 inches	0	0	0	0	0	0	1	3.3	0	0	0	0	0	0	0	0
21 to 25 inches	32	76.2	0	0	0	0	16	53.3	22	71	1	50	4	57.1	0	0
26 to 30 inches	7	16.7	0	0	0	0	13	43.3	7	22.6	0	0	3	42.9	1	100
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	42	100	0	0	0	0	30	100	31	100	2	100	7	100	1	100
North Dakota																
< 11 inches	1	4	0	0	0	0	0	0	0	0	0	0	1	1	0	0
11 to 15 inches	2	8	0	0	0	0	0	0	1	5.6	0	0	6	5.9	0	0
16 to 20 inches	0	0	0	0	0	0	0	0	0	0	0	0	12	11.9	0	0
21 to 25 inches	17	68	1	50	1	100	1	100	15	83.3	1	50	41	40.6	3	75
26 to 30 inches	5	20	1	50	0	0	0	0	2	11.1	1	50	39	38.6	1	25
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
Total	25	100	2	100	1	100	1	100	18	100	2	100	101	100	4	100
Northarvest																
< 11 inches	2	3	0	0	0	0	0	0	0	0	1	25	1	0.9	0	0
11 to 15 inches	4	6	0	0	0	0	0	0	3	6.1	0	0	6	5.6	0	0
16 to 20 inches	0	0	0	0	0	0	1	3.2	0	0	0	0	12	11.1	0	0
21 to 25 inches	49	73.1	1	50	1	100	17	54.8	37	75.5	2	50	45	41.7	3	60
26 to 30 inches	12	17.9	1	50	0	0	13	41.9	9	18.4	1	25	42	38.9	2	40
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	2	1.9	0	0
Total	67	100	2	100	1	100	31	100	49	100	4	100	108	100	5	100

^aBlack, navy and pinto varieties are typically Type II (upright) varieties.

Table 8. Seeding rate by dry bean market class in 2022.

Seeding rate ^a	Black ^b		Cranberry		Great Northern		Kidney		Navy ^b		Pink		Pinto ^b		Small Red	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Minnesota																
60 to 69,000	1	2.6	0	0	0	0	3	10.3	1	3.2	0	0	0	0	0	0
70 to 79,000	1	2.6	0	0	0	0	5	17.2	1	3.2	1	50	4	57.1	1	100
80 to 89,000	1	2.6	0	0	0	0	14	48.3	0	0	0	0	3	42.9	0	0
90 to 99,000	2	5.1	0	0	0	0	6	20.7	0	0	1	50	0	0	0	0
100 to 109,000	7	17.9	0	0	0	0	1	3.4	3	9.7	0	0	0	0	0	0
110 to 119,000	18	46.2	0	0	0	0	0	0	14	45.2	0	0	0	0	0	0
120 to 129,000	8	20.5	0	0	0	0	0	0	12	38.7	0	0	0	0	0	0
130 to 139,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>139,000	1	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	39	100	0	0	0	0	29	100	31	100	2	100	7	100	1	100
North Dakota																
60 to 69,000	0	0	0	0	0	0	0	0	0	0	0	0	4	4.1	0	0
70 to 79,000	1	3.8	0	0	0	0	0	0	0	0	0	0	37	37.8	0	0
80 to 89,000	0	0	0	0	1	100	1	100	0	0	1	50	42	42.9	0	0
90 to 99,000	0	0	1	100	0	0	0	0	0	0	1	50	12	12.2	2	66.7
100 to 109,000	4	15.4	0	0	0	0	0	0	3	17.6	0	0	3	3.1	1	33.3
110 to 119,000	16	61.5	0	0	0	0	0	0	3	17.6	0	0	0	0	0	0
120 to 129,000	4	15.4	0	0	0	0	0	0	11	64.7	0	0	0	0	0	0
130 to 139,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>139,000	1	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	26	100	1	100	1	100	1	100	17	100	2	100	98	100	3	100
Northarvest																
60 to 69,000	1	1.5	0	0	0	0	3	10	1	2.1	0	0	4	3.8	0	0
70 to 79,000	2	3.1	0	0	0	0	5	16.7	1	2.1	1	25	41	39	1	25
80 to 89,000	1	1.5	0	0	1	100	15	50	0	0	1	25	45	42.9	0	0
90 to 99,000	2	3.1	1	100	0	0	6	20	0	0	2	50	12	11.4	2	50
100 to 109,000	11	16.9	0	0	0	0	1	3.3	6	12.5	0	0	3	2.9	1	25
110 to 119,000	34	52.3	0	0	0	0	0	0	17	35.4	0	0	0	0	0	0
120 to 129,000	12	18.5	0	0	0	0	0	0	23	47.9	0	0	0	0	0	0
130 to 139,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>139,000	2	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	65	100	1	100	1	100	30	100	48	100	4	100	105	100	4	100

^aLive seeds per acre. ^bBlack, navy and pinto varieties are typically Type II (upright) varieties.

Table 9. Percent of total dry bean acres harvested by direct combining in 2022.

Percent direct combined	Respondents (no.)	Respondents (%)	Acres reported ^a	Acres reported ^a (%)
Minnesota				
1 to 25%	1	1.1	620	1.3
26 to 50%	5	5.7	4,251	9
51 to 75%	7	8	6,580	14
76 to 99%	2	2.3	663	1.4
100%	54	61.4	21,084	44.9
No direct harvest	19	21.6	13,806	29.4
Total	88	100	47,004	100
North Dakota				
1 to 25%	6	4.5	5,910	6.9
26 to 50%	2	1.5	1,856	2.2
51 to 75%	1	0.8	1,800	2.1
76 to 99%	6	4.5	2,101	2.5
100%	107	81.1	65,017	76.4
No direct harvest	10	7.6	8,380	9.9
Total	132	100	85,064	100
Northharvest				
1 to 25%	7	3.2	6,530	4.9
26 to 50%	7	3.2	6,107	4.6
51 to 75%	8	3.6	8,380	6.3
76 to 99%	8	3.6	2,764	2.1
100%	161	73.2	86,101	65.2
No direct harvest	29	13.2	22,186	16.8
Total	220	100	132,068	100

^aRespondents' harvested acres only.

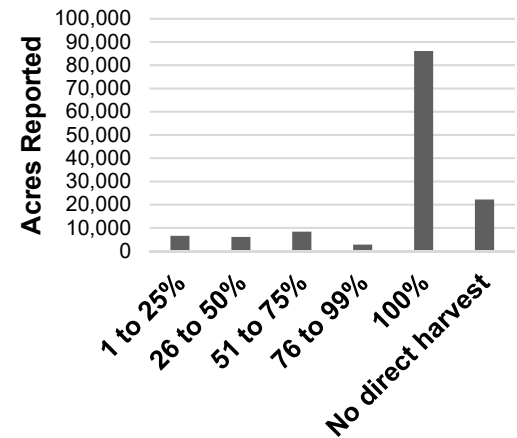


Figure 5. Northharvest percent of dry bean acres harvested by direct combining in 2022.

Table 10. Estimated yield loss in harvested dry beans in 2022.

Estimated yield loss	Direct Harvest		Conventional Harvest	
	Respondents (no.)	Respondents (%)	Respondents (no.)	Respondents (%)
Minnesota				
1 to 5%	44	63.8	28	82.4
6 to 10%	23	33.3	5	14.7
11 to 15%	1	1.4	1	2.9
16 to 20%	1	1.4	0	0
Total	69	100	34	100
North Dakota				
1 to 5%	57	46.7	19	76
6 to 10%	45	36.9	5	20
11 to 15%	16	13.1	1	4
16 to 20%	4	3.3	0	0
Total	122	100	25	100
Northharvest				
1 to 5%	101	52.9	47	79.7
6 to 10%	68	35.6	10	16.9
11 to 15%	17	8.9	2	3.4
16 to 20%	5	2.6	0	0
Total	191	100	59	100

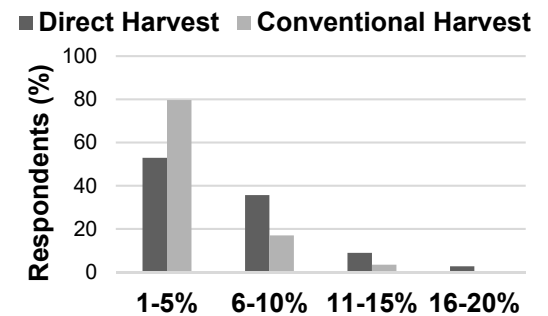


Figure 6. Northharvest estimated yield loss in harvested dry beans in 2022.

Table 11. Dry bean field tillage practices in 2022.

Tillage practice	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Conventional	42,269	89.8
Minimum	4,328	9.2
No-till	422	0.9
Strip-tillage	65	0.1
Total	47,084	100
North Dakota		
Conventional	59,433	69
Minimum	15,466	18
No-till	10,991	12.8
Strip-tillage	224	0.3
Total	86,114	100
Northarvest		
Conventional	101,702	76.4
Minimum	19,794	14.9
No-till	11,413	8.6
Strip-tillage	289	0.2
Total	133,198	100

^aRespondents' acres only.

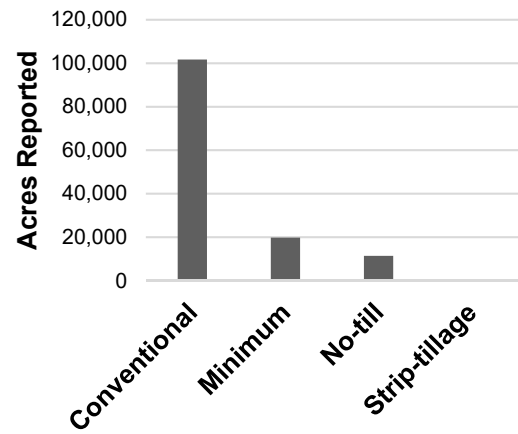


Figure 7. Northarvest dry bean field tillage practices in 2022.

Agronomy

Table 12. Cover crop use on dry bean fields in 2022.

Cover crop use	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
Yes	29	32.6	17,501	37.2
No	60	67.4	29,583	62.8
Total	89	100	47,084	100
North Dakota				
Yes	17	12.8	10,748	12.5
No	116	87.2	75,366	87.5
Total	133	100	86,114	100
Northarvest				
Yes	46	20.7	28,249	21.2
No	176	79.3	104,949	78.8
Total	222	100	133,198	100

^aRespondents' acres only.

Table 13. Reasons for cover crop use on dry bean fields in 2022.

Cover crop practice	Respondents (no.)	Respondents (%) ^a	Acres reported (no.) ^b	Acres reported (%) ^{a,b}
Minnesota				
Reduce soil erosion	28	96.6	17,461	99.8
Improve soil health	18	62.1	9,681	55.3
Soil moisture conservation	7	24.1	5,816	33.2
Weed control	8	27.6	5,191	29.7
Protect seedlings	1	3.4	2,114	12.1
North Dakota				
Reduce soil erosion	16	94.1	10,198	94.9
Improve soil health	8	47.1	3,337	31
Soil moisture conservation	5	29.4	3,025	28.1
Weed control	4	23.5	2,188	20.4
Northarvest				
Reduce soil erosion	44	95.7	27,659	97.9
Improve soil health	26	56.5	13,018	46.1
Soil moisture conservation	12	26.1	8,841	31.3
Weed control	12	26.1	7,379	26.1
Protect seedlings	1	2.2	2,114	7.5

^aPercentages do not total 100% because some respondents gave more than one reason. ^bRespondents' acres only.

Table 14. Seasonal use of cover crops on dry bean fields in 2022.

Cover crop seasonal use	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
After dry bean harvest	23	79.3	11,039	63.1
Prior to planting dry beans	2	6.9	4,314	24.7
Prior to planting and after dry bean harvest	4	13.8	2,148	12.3
Total	29	100	17,501	100
North Dakota				
After dry bean harvest	12	70.6	6,875	64
Prior to planting and after dry bean harvest	2	11.8	2,274	21.2
Prior to planting dry beans	2	11.8	1,475	13.7
During dry bean production	1	5.9	124	1.2
Total	17	100	10,748	100
Northharvest				
After dry bean harvest	35	76.1	17,914	63.4
Prior to planting dry beans	4	8.7	5,789	20.5
Prior to planting and after dry bean harvest	6	13	4,422	15.7
During dry bean production	1	2.2	124	0.4
Total	46	100	28,249	100

^aRespondents' acres only.**Table 15. Cover crop species composition on dry bean fields in 2022.**

Cover crop species composition	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
Cereal grass species only	26	89.7	16,886	96.5
Cereal grass + broadleaf species	3	10.3	615	3.5
Total	29	100	17,501	100
North Dakota				
Cereal grass species only	13	76.5	8,513	79.2
Cereal grass + broadleaf species	4	23.5	2,235	20.8
Total	17	100	10,748	100
Northharvest				
Cereal grass species only	39	84.8	25,399	89.9
Cereal grass + broadleaf species	7	15.2	2,850	10.1
Total	46	100	28,249	100

^aRespondents' acres only.

Table 16. Use of fertilizers on dry bean fields in 2022.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Nitrogen	78	97.5
Phosphorus	75	93.8
Potash	61	76.3
Zinc	58	72.5
Sulfur	49	61.3
North Dakota		
Nitrogen	104	90.4
Phosphorus	98	85.2
Potash	57	49.6
Zinc	75	65.2
Sulfur	37	32.2
Northarvest		
Nitrogen	182	93.3
Phosphorus	173	88.7
Potash	118	60.5
Zinc	133	68.2
Sulfur	86	44.1

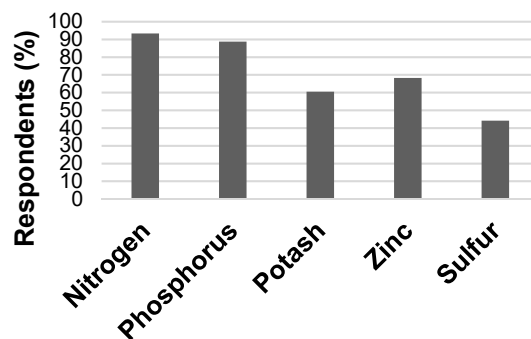


Figure 8. Northharvest use of fertilizers on dry bean fields in 2022.

Table 17. Fertilizer application methods on dry bean fields in 2022.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Broadcast	83	94.3
In-furrow	34	38.6
Banded	11	12.5
Foliar	15	17
North Dakota		
Broadcast	97	79.5
In-furrow	71	58.2
Banded	20	16.4
Foliar	12	9.8
Northarvest		
Broadcast	180	85.7
In-furrow	105	50
Banded	31	14.8
Foliar	27	12.9

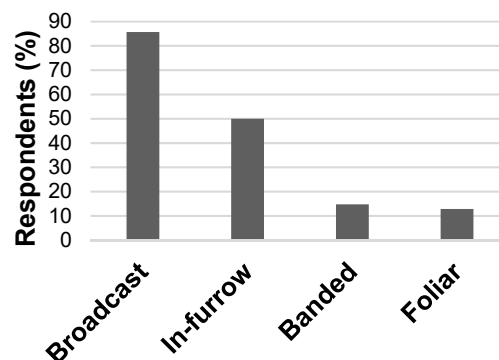


Figure 9. Northharvest fertilizer application methods on dry bean fields in 2022.

Table 18. Use of soil test prior to fertilization of dry bean fields in 2022.

Soil test	Respondents (no.)	Respondents (%)
Minnesota		
Soil test used	71	79.8
Soil test not used	18	20.2
Total	89	100
North Dakota		
Soil test used	104	81.3
Soil test not used	24	18.8
Total	128	100
Northarvest		
Soil test used	175	80.6
Soil test not used	42	19.4
Total	217	100

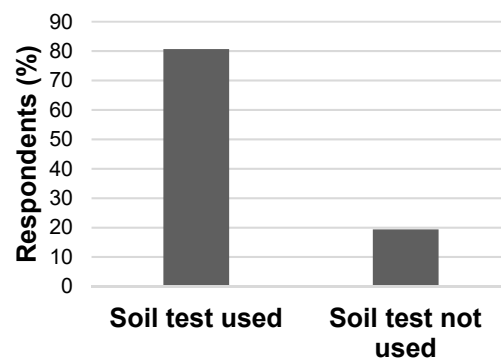


Figure 10. Northharvest use of soil test in 2022.

Table 19. Use of *Rhizobium* inoculants on dry bean fields in 2022.

<i>Rhizobium</i> use	Respondents (no.)	Respondents (%)
Minnesota		
Inoculant used	14	16.1
Inoculant not used	73	83.9
Total	87	100
North Dakota		
Inoculant used	25	19.2
Inoculant not used	105	80.8
Total	130	100
Northharvest		
Inoculant used ^a	39	18
Inoculant not used	178	82
Total	217	100

^aOf producers that used inoculant, 89.2% used a dry-bean specific inoculant.

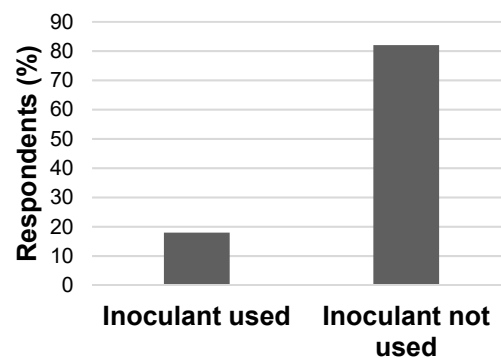


Figure 11. Northharvest use of inoculant in 2022.

Table 20. Use of site-specific nutrient management (SSNM) on dry bean fields in 2022.

	Respondents (no.)	Respondents (%)
Minnesota		
SSNM used	27	30.3
SSNM not used	62	69.7
Total	89	100
North Dakota		
SSNM used	38	30.2
SSNM not used	88	69.8
Total	126	100
Northharvest		
SSNM used	65	30.2
SSNM not used	150	69.8
Total	215	100

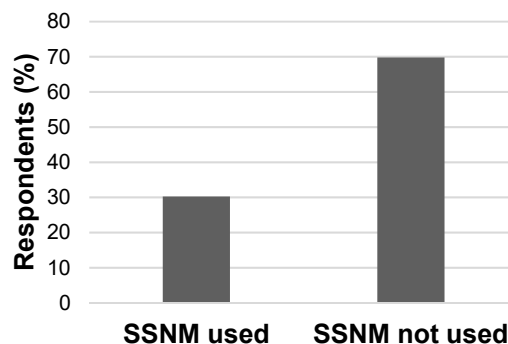


Figure 12. Northharvest use of site-specific nutrient management in 2022.

Table 21. Desiccants used on dry beans in 2022.

Desiccant	Respon- dents (no.)	Respon- dents (%) ^a	Acres reported (no.) ^b	Acres reported (%) ^{a,b}
Minnesota				
Sharpen	65	74.7	26,896	57.4
Valor	20	23	13,914	29.7
Paraquat	14	16.1	5,437	11.6
None used	14	16.1	5,111	10.9
Glyphosate	4	4.6	1,190	2.5
Sodium chlorate	1	1.1	130	0.3
Desiccant Total			52,678	
North Dakota				
Sharpen	81	62.8	43,353	51.5
Paraquat	45	34.9	24,819	29.5
Valor	31	24	22,780	27
None used	23	17.8	13,244	15.7
Glyphosate	22	17.1	12,894	15.3
Aim	3	2.3	2,550	3
Sodium chlorate	1	0.8	1,000	1.2
Desiccant Total			120,640	
Northharvest				
Sharpen	146	67.6	70,249	53.6
Valor	51	23.6	36,694	28
Paraquat	59	27.3	30,256	23.1
None used	37	17.1	18,355	14
Glyphosate	26	12	14,084	10.7
Aim	3	1.4	2,550	1.9
Sodium chlorate	2	0.9	1,130	0.9
Desiccant Total			173,318	

^aPercentages do not total 100% because some respondents used more than one desiccant.

^bRespondents' acres only.

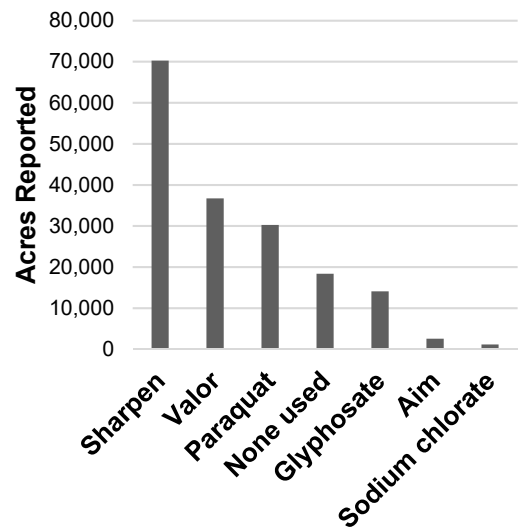


Figure 13. Northharvest desiccants used on dry beans in 2022.

Table 22. Desiccant tank mixes used on dry beans in 2022.

Desiccant Combination	Respondents (no.)	Acres reported (no.)
Minnesota		
Paraquat + Sharpen	6	2,846
Sharpen + Valor	1	911
Glyphosate + Sharpen	2	780
Paraquat + Valor	1	700
Sharpen + Sodium chlorate	1	130
North Dakota		
Paraquat + Sharpen	15	9,954
Paraquat + Valor	8	5,955
Glyphosate + Valor	4	5,535
Glyphosate + Sharpen	9	3,977
Sharpen + Valor	6	2,946
Paraquat + Sharpen + Aim	1	1,500
Sodium chlorate + Aim	1	1,000
Paraquat + Sharpen + Valor	1	170
Northharvest		
Paraquat + Sharpen	21	12,800
Paraquat + Valor	9	6,655
Glyphosate + Valor	4	5,535
Glyphosate + Sharpen	11	4,757
Sharpen + Valor	7	3,857
Paraquat + Sharpen + Aim	1	1,500
Sodium chlorate + Aim	1	1,000
Paraquat + Sharpen + Valor	1	170
Sharpen + Sodium chlorate	1	130

Table 23. Frequency of previous crops (2018-2021) in fields planted to dry beans in 2022.

Year	2021	2020	2019	2018	4-year average
Crop	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)
Minnesota					
Corn	72.4	33.3	42.9	42.9	47.9
Soybean	3.4	28.6	17.9	26	19
Dry Bean	2.3	15.5	29.8	23.4	17.7
Wheat	17.2	20.2	16.7	11.7	16.5
Sugarbeet	21.8	15.5	7.1	15.6	15
Potato	3.4	10.7	6	3.9	6
Barley	3.4	2.4	2.4	3.9	3
Field Pea	1.1	2.4	0	2.6	1.5
Rye	0	2.4	2.4	1.3	1.5
Hay/Grass	1.1	1.2	1.2	1.3	1.2
Oats	1.1	2.4	1.2	0	1.2
Alfalfa	0	0	1.2	0	0.3
Sorghum	0	0	1.2	0	0.3
No Crop	0	0	1.2	0	0.3
North Dakota					
Wheat	61.4	30.8	47.6	23.1	40.7
Dry Bean	3.8	40.8	28.6	44.6	29.4
Corn	40.2	6.9	31.7	20.7	24.9
Soybean	1.5	29.2	16.7	24.8	18.1
Sugarbeet	20.5	7.7	3.2	11.6	10.7
Barley	4.5	3.1	2.4	4.1	3.5
Potato	1.5	4.6	2.4	3.3	3
Canola	0	3.1	0	0.8	1
Field Pea	0.8	0	0.8	0.8	0.6
Sunflower	0.8	0.8	0	0.8	0.6
Flax	0.8	0	0	0.8	0.4
Rye	0	0	0.8	0	0.2
No Crop	0	0	0.8	0	0.2
Northarvest					
Corn	53	17.3	36.2	29.3	33.9
Wheat	43.8	26.6	35.2	18.7	31.1
Dry Bean	3.2	30.8	29	36.4	24.9
Soybean	2.3	29	17.1	25.3	18.4
Sugarbeet	21	10.7	4.8	13.1	12.4
Potato	2.3	7	3.8	3.5	4.2
Barley	4.1	2.8	2.4	4	3.3
Field Pea	0.9	0.9	0.5	1.5	1
Rye	0	0.9	1.4	0.5	0.7
Canola	0	1.9	0	0.5	0.6
Hay/Grass	0.5	0.5	0.5	0.5	0.5
Oats	0.5	0.9	0.5	0	0.5
Sunflower	0.5	0.5	0	0.5	0.4
Flax	0.5	0	0	0.5	0.2
No Crop	0	0	1	0	0.2
Alfalfa	0	0	0.5	0	0.1
Sorghum	0	0	0.5	0	0.1

Table 24. 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	47.1
2 of past 5 years	38	43.7
3 of past 5 years	5	5.7
4 of past 5 years	2	2.3
5 of past 5 years	1	1.1
Total	87	100
North Dakota		
1 of past 5 years	30	22.7
2 of past 5 years	63	47.7
3 of past 5 years	33	25
4 of past 5 years	5	3.8
5 of past 5 years	1	0.8
Total	132	100
Northarvest		
1 of past 5 years	71	32.4
2 of past 5 years	101	46.1
3 of past 5 years	38	17.4
4 of past 5 years	7	3.2
5 of past 5 years	2	0.9
Total	219	100

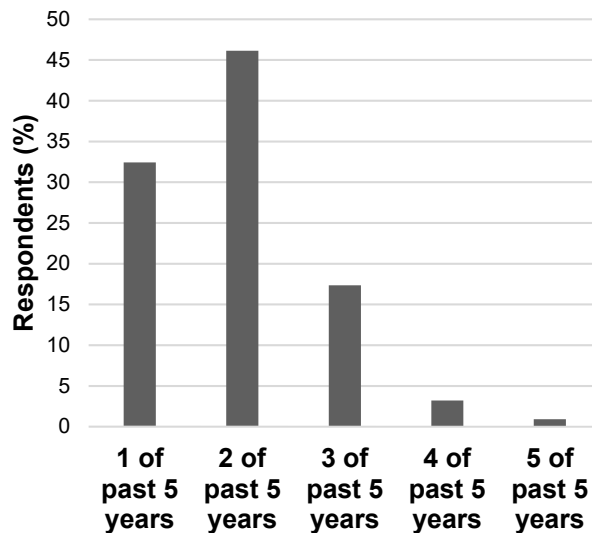


Figure 14. Northarvest number of years dry beans are grown in dry bean crop rotation program.

Insect Pests and Insecticide Use

Table 25. Worst insect problem in dry beans in 2022.

Insect ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
None	43	49.4	24,910	53.2
Leafhoppers	18	20.7	11,503	24.6
Grasshoppers	12	13.8	5,787	12.4
Aphids	4	4.6	1,817	3.9
Spider mites	3	3.4	1,032	2.2
Foliage caterpillars	2	2.3	873	1.9
Bean leaf beetle	4	4.6	829	1.8
Wireworms	1	1.1	40	0.1
Total	87	100	46,791	100
North Dakota				
Grasshoppers	61	47.7	46,899	54.8
None	47	36.7	24,849	29
Seedcorn maggot	1	0.8	4,558	5.3
Bean leaf beetle	3	2.3	2,980	3.5
Wireworms	4	3.1	2,150	2.5
Spider mites	2	1.6	1,427	1.7
Cutworms	4	3.1	1,124	1.3
Leafhoppers	2	1.6	1,071	1.3
Aphids	2	1.6	304	0.4
Armyworms	2	1.6	242	0.3
Total	128	100	85,604	100
Northarvest				
Grasshoppers	73	34	52,686	39.8
None	90	41.9	49,759	37.6
Leafhoppers	20	9.3	12,574	9.5
Seedcorn maggot	1	0.5	4,558	3.4
Bean leaf beetle	7	3.3	3,809	2.9
Spider mites	5	2.3	2,459	1.9
Wireworms	5	2.3	2,190	1.7
Aphids	6	2.8	2,121	1.6
Cutworms	4	1.9	1,124	0.8
Foliage caterpillars	2	0.9	873	0.7
Armyworms	2	0.9	242	0.2
Total	215	100	132,395	100

^aRanked as No. 1 insect problem by respondents.

^bRespondents' acres only.

^cInsect problem may not have been present across all reported acres.

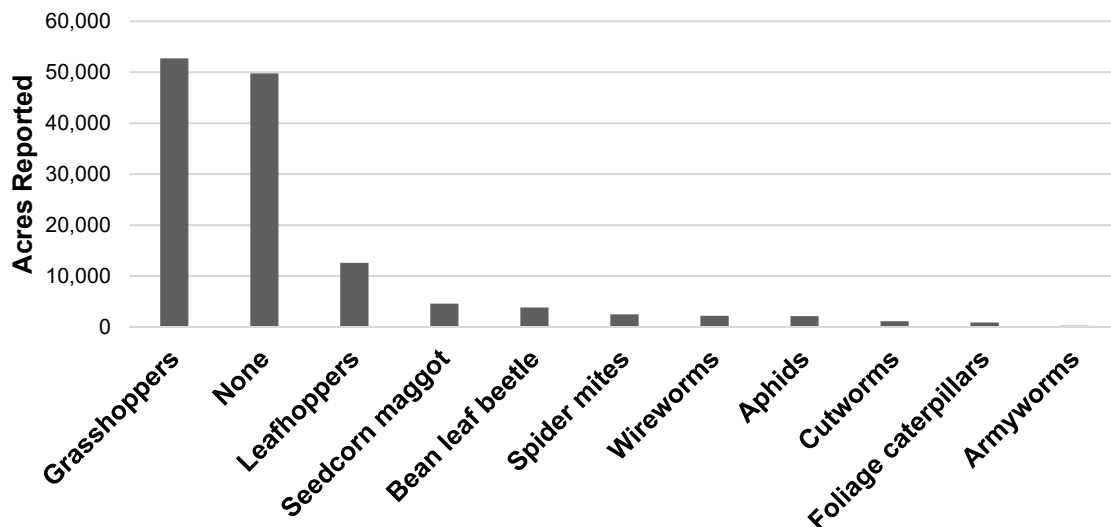


Figure 15. Northarvest worst insect problem in dry beans in 2022.

Table 26. Insects ranked as one of the three worst in dry beans in 2022.

Insect ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
None	43	49.4	24,910	53.2
Leafhoppers	36	41.4	19,190	41
Grasshoppers	18	20.7	9,315	19.9
Aphids	12	13.8	8,388	17.9
Spider mites	11	12.6	4,484	9.6
Bean leaf beetle	8	9.2	3,717	7.9
Foliage caterpillars	6	6.9	2,357	5
Armyworms	1	1.1	635	1.4
Wireworms	3	3.4	513	1.1
Seedcorn maggot	1	1.1	450	1
Cutworms	1	1.1	135	0.3
North Dakota				
Grasshoppers	73	55.3	53,413	62.1
None	47	35.6	24,849	28.9
Aphids	22	16.7	15,203	17.7
Leafhoppers	18	13.6	12,948	15.1
Wireworms	15	11.4	10,526	12.2
Spider mites	11	8.3	9,290	10.8
Cutworms	14	10.6	7,469	8.7
Seedcorn maggot	7	5.3	5,001	5.8
Bean leaf beetle	5	3.8	3,934	4.6
Armyworms	4	3	2,275	2.6
Foliage caterpillars	2	1.5	938	1.1
Northharvest				
Grasshoppers	91	41.6	62,728	47.3
None	90	41.1	49,759	37.5
Leafhoppers	54	24.7	32,138	24.2
Aphids	34	15.5	23,591	17.8
Spider mites	22	10	13,774	10.4
Wireworms	18	8.2	11,039	8.3
Bean leaf beetle	13	5.9	7,651	5.8
Cutworms	15	6.8	7,604	5.7
Seedcorn maggot	8	3.7	5,451	4.1
Foliage caterpillars	8	3.7	3,295	2.5
Armyworms	5	2.3	2,910	2.2

^aRanked as No. 1, 2 or 3 insect problem by respondents.

^bRespondents' acres only.

^cInsect problem may not have been present across all reported acres.

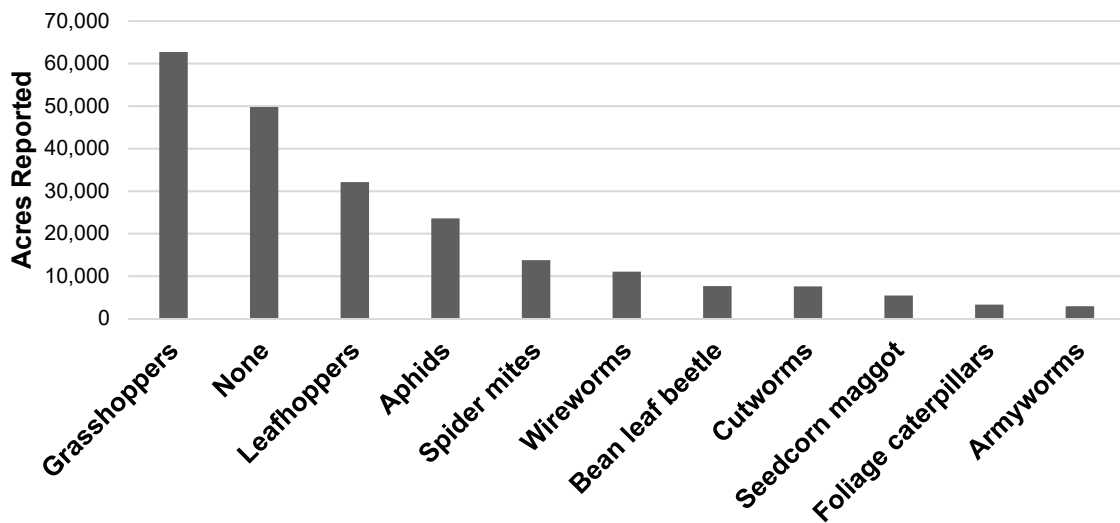


Figure 16. Northharvest insects ranked as one of the three worst in dry beans in 2022.

Table 27. Foliar insecticide use in dry beans in 2022.

Insecticide	Respondents (no.)	Respondents (%)	Acres reported (no.)^{a,b}	Acres reported (%)^{a,b}
Minnesota				
None	63	71.6	32,460	69.1
Warrior/generics	15	17	6,892	14.7
Mustang Maxx	2	2.3	4,434	9.4
Hero	2	2.3	4,314	9.2
Asana XL	4	4.5	873	1.9
Tombstone	1	1.1	700	1.5
Baythroid XL	1	1.1	530	1.1
Brigade/generics	2	2.3	314	0.7
Insecticide Total			18,057	
North Dakota				
None	113	85.6	71,173	82.8
Warrior/generics	12	9.1	8,842	10.3
Brigade/generics	4	3	3,904	4.5
Prev-Am Ultra	2	1.5	3,189	3.7
Tombstone	2	1.5	781	0.9
Hero	1	0.8	500	0.6
Baythroid XL	2	1.5	351	0.4
Dimethoate	1	0.8	345	0.4
Mustang Maxx	2	1.5	84	0.1
Insecticide Total			17,996	
Northarvest				
None	176	80	103,633	77.9
Warrior/generics	27	12.3	15,734	11.8
Hero	3	1.4	4,814	3.6
Mustang Maxx	4	1.8	4,518	3.4
Brigade/generics	6	2.7	4,218	3.2
Prev-Am Ultra	2	0.9	3,189	2.4
Tombstone	3	1.4	1,481	1.1
Baythroid XL	3	1.4	881	0.7
Asana XL	4	1.8	873	0.7
Dimethoate	1	0.5	345	0.3
Insecticide Total			36,053	

^aRespondents' acres only. Multiple applications count as multiple acres.

^bPercentages 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.

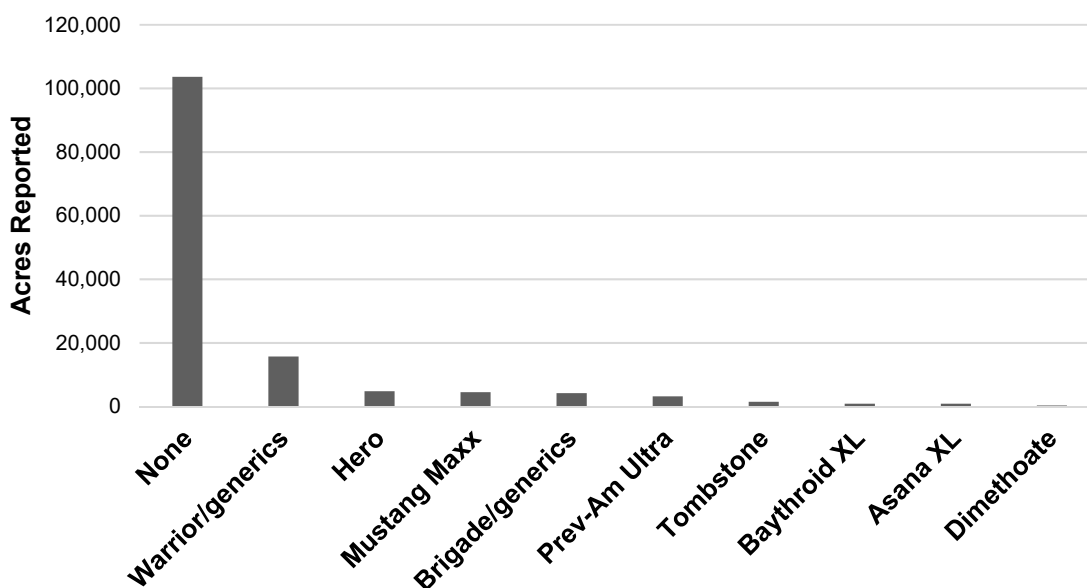


Figure 17. Northarvest foliar insecticide use in dry beans in 2022.

Table 28. Seed treatment and soil insecticide use in dry beans in 2022.

Seed Treatment	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{a,b}	Acres reported (%) ^{a,b}
Minnesota				
Cruiser Maxx	43	48.9	25,557	54.4
Don't know	22	25	9,402	20
None	19	21.6	7,651	16.3
Cruiser Maxx Vibrance	6	6.8	4,383	9.3
Cruiser 5FS	2	2.3	1,946	4.1
Gaucho 600	1	1.1	675	1.4
Capture LFR ^c	1	1.1	540	1.1
Insecticide Total			42,503	
North Dakota				
None	52	39.7	35,066	40.9
Cruiser Maxx	39	29.8	22,184	25.9
Don't know	27	20.6	17,460	20.4
Cruiser Maxx Vibrance	12	9.2	9,458	11
Capture LFR ^c	2	1.5	2,390	2.8
Cruiser 5FS	2	1.5	1,788	2.1
Gaucho 600	1	0.8	800	0.9
Insecticide Total			54,080	
Northharvest				
Cruiser Maxx	82	37.4	47,741	36
None	71	32.4	42,717	32.2
Don't know	49	22.4	26,862	20.2
Cruiser Maxx Vibrance	18	8.2	13,841	10.4
Cruiser 5FS	4	1.8	3,734	2.8
Capture LFR ^c	3	1.4	2,930	2.2
Gaucho 600	2	0.9	1,475	1.1
Insecticide Total			96,583	

^aRespondents' acres only.

^bPercentages 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.

^cSoil-applied insecticide.

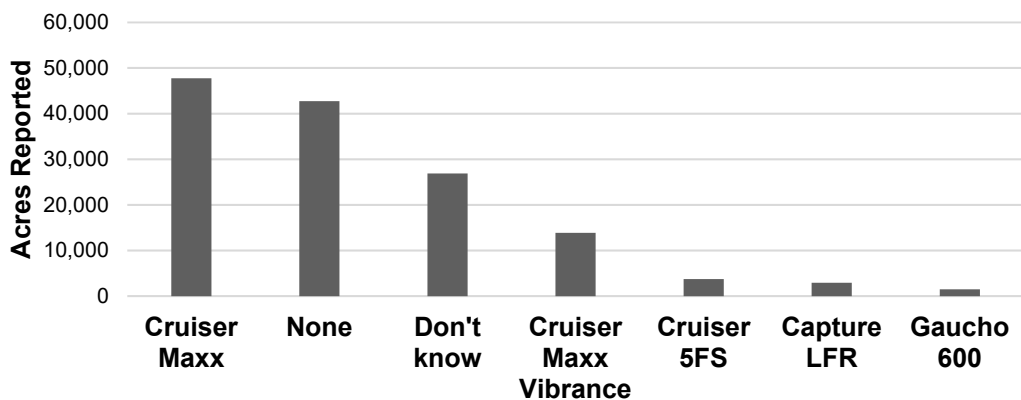


Figure 18. Northharvest insecticide seed treatment and soil insecticide use in dry beans in 2022.

Plant Diseases and Fungicide Use

Table 29. Worst disease problem in dry beans in 2022.

Disease ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
White mold	45	51.1	25,285	53.8
Common bacterial blight	18	20.5	13,165	28
None	18	20.5	3,995	8.5
Bacterial brown spot	3	3.4	1,850	3.9
Rust	1	1.1	1,800	3.8
Root rot	1	1.1	630	1.3
Anthrachnose	1	1.1	144	0.3
Other viruses	1	1.1	135	0.3
Total	88	100	47,004	100
North Dakota				
White mold	56	42.7	41,558	48.4
None	36	27.5	14,554	16.9
Common bacterial blight	15	11.5	11,693	13.6
Root rot	8	6.1	5,916	6.9
Bacterial wilt	2	1.5	3,790	4.4
Anthrachnose	2	1.5	3,618	4.2
Bacterial brown spot	6	4.6	2,846	3.3
Rust	4	3.1	995	1.2
Halo blight	1	0.8	680	0.8
Other viruses	1	0.8	280	0.3
Total	131	100	85,930	100
Northarvest				
White mold	101	46.1	66,843	50.3
Common bacterial blight	33	15.1	24,858	18.7
None	54	24.7	18,549	14
Root rot	9	4.1	6,546	4.9
Bacterial brown spot	9	4.1	4,696	3.5
Bacterial wilt	2	0.9	3,790	2.9
Anthrachnose	3	1.4	3,762	2.8
Rust	5	2.3	2,795	2.1
Halo blight	1	0.5	680	0.5
Other viruses	2	0.9	415	0.3
Total	219	100	132,934	100

^aRanked as No. 1 disease problem by respondents.

^bRespondents' acres only.

^cDisease problem may not have been present across all reported acres.

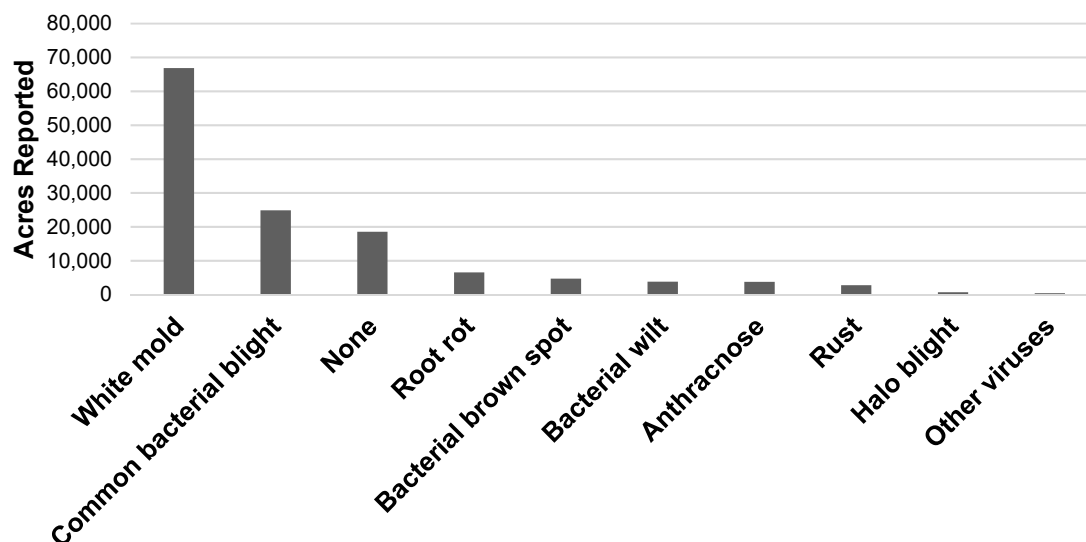


Figure 19. Northarvest worst disease problem in dry beans in 2022.

Table 30. Diseases ranked as one of the three worst in dry beans in 2022.

Disease ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
White mold	60	68.2	35,636	75.8
Common bacterial blight	39	44.3	23,150	49.3
Root rot	13	14.8	11,145	23.7
Bacterial brown spot	11	12.5	8,781	18.7
Rust	7	8	5,831	12.4
Bacterial wilt	5	5.7	4,018	8.5
None	18	20.5	3,995	8.5
Other viruses	5	5.7	3,003	6.4
Anthrachnose	6	6.8	2,794	5.9
Halo blight	6	6.8	1,991	4.2
Bean common mosaic virus	1	1.1	110	0.2
North Dakota				
White mold	77	58.8	58,114	67.6
Common bacterial blight	47	35.9	36,250	42.2
Rust	24	18.3	18,672	21.7
Bacterial brown spot	20	15.3	16,726	19.5
None	36	27.5	14,554	16.9
Root rot	18	13.7	12,435	14.5
Bacterial wilt	6	4.6	7,385	8.6
Anthrachnose	7	5.3	6,637	7.7
Halo blight	5	3.8	3,909	4.5
Other viruses	4	3.1	1,283	1.5
Northarvest				
White mold	137	62.6	93,750	70.5
Common bacterial blight	86	39.3	59,400	44.7
Bacterial brown spot	31	14.2	25,507	19.2
Rust	31	14.2	24,503	18.4
Root rot	31	14.2	23,580	17.7
None	54	24.7	18,549	14
Bacterial wilt	11	5	11,403	8.6
Anthrachnose	13	5.9	9,431	7.1
Halo blight	11	5	5,900	4.4
Other viruses	9	4.1	4,286	3.2
Bean common mosaic virus	1	0.5	110	0.1

^aRanked as No. 1, 2 or 3 disease problem by respondents.

^bRespondents' acres only.

^cDisease problem may not have been present across all reported acres.

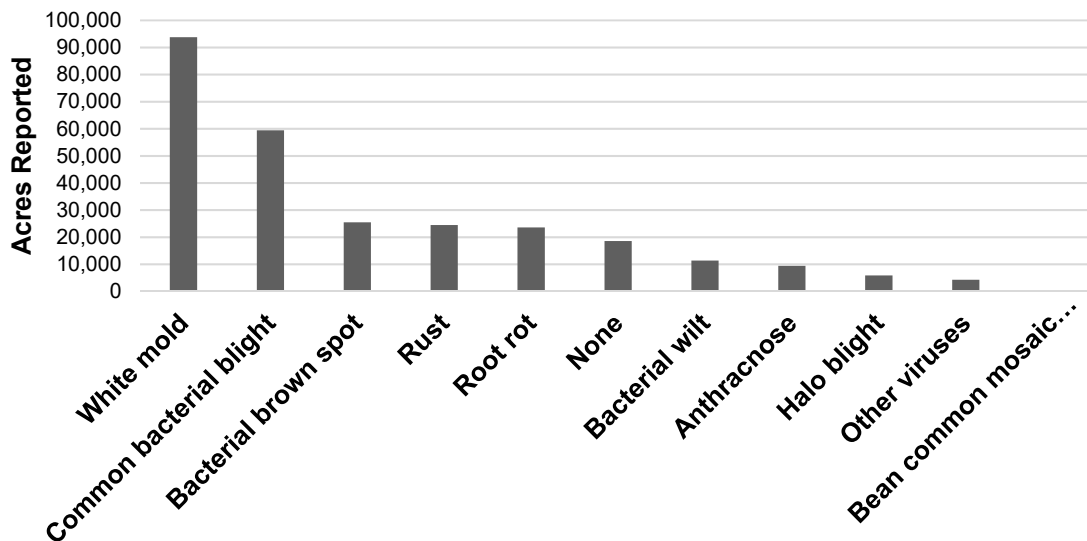


Figure 20. Northarvest diseases ranked as one of the three worst in dry beans in 2022.

Table 31. Foliar fungicide use in dry beans in 2022.

Fungicide	Respon- dents (no.)	Respon- dents (%)	Acres treated (no.) ^a	Acres treated (%) ^b	Fungicide	Respon- dents (no.)	Respon- dents (%)	Acres treated (no.) ^a	Acres treated (%) ^b
Minnesota					Northharvest				
Endura	42	47.7	24,323	51.7	Endura	87	39.5	55,390	41.7
T-Methyl	28	31.8	19,860	42.3	T-Methyl	57	25.9	45,629	34.3
Topsin	23	26.1	12,696	27	None	76	34.5	33,758	25.4
Omega	3	3.4	9,228	19.6	Topsin	47	21.4	30,357	22.8
ProPulse	8	9.1	8,413	17.9	ProPulse	11	5	11,411	8.6
None	22	25	6,330	13.5	Omega	3	1.4	9,228	6.9
Proline	2	2.3	4,314	9.2	Priaxor	9	4.1	8,762	6.6
Priaxor	4	4.5	4,180	8.9	Incognito	8	3.6	6,956	5.2
Sanidate	2	2.3	3,700	7.9	Tebuzol	5	2.3	5,701	4.3
Incognito	3	3.4	2,756	5.9	Proline	4	1.8	5,632	4.2
Monsoon	1	1.1	1,800	3.8	Sanidate	2	0.9	3,700	2.8
Miravis Neo	2	2.3	1,680	3.6	Monsoon	3	1.4	3,360	2.5
Badge	2	2.3	1,540	3.3	Prev-Am Ultra	2	0.9	3,189	2.4
Delaro	2	2.3	1,300	2.8	Zolera	2	0.9	2,630	2
Headline	4	4.5	1,173	2.5	Tebuconazole	3	1.4	2,088	1.6
Tebuzol	1	1.1	1,121	2.4	Headline	7	3.2	2,039	1.5
Provysol	1	1.1	1,030	2.2	Miravis Neo	2	0.9	1,680	1.3
Tebuconazole	1	1.1	635	1.4	Folicur	2	0.9	1,620	1.2
Champ	2	2.3	609	1.3	Badge	2	0.9	1,540	1.2
Oxidate	2	2.3	465	1	Delaro	3	1.4	1,515	1.1
Veltyma	1	1.1	144	0.3	Evito	1	0.5	1,350	1
Quadris/Amstar	1	1.1	76	0.2	Quadris/Amstar	3	1.4	1,326	1
Contans	1	1.1	16	0	Oxidate	3	1.4	1,115	0.8
Fungicide Total			101,059		Provysol	1	0.5	1,030	0.8
North Dakota					Champ	2	0.9	609	0.5
Endura	45	34.1	31,067	36.1	Miravis Top	1	0.5	300	0.2
None	54	40.9	27,428	31.9	Veltyma	1	0.5	144	0.1
T-Methyl	29	22	25,769	30	Tebucure	1	0.5	124	0.1
Topsin	24	18.2	17,661	20.5	Contans	1	0.5	16	0
Priaxor	5	3.8	4,582	5.3	Fungicide Total			208,441	
Tebuzol	4	3	4,580	5.3					
Incognito	5	3.8	4,200	4.9					
Prev-Am Ultra	2	1.5	3,189	3.7					
ProPulse	3	2.3	2,998	3.5					
Zolera	2	1.5	2,630	3.1					
Folicur	2	1.5	1,620	1.9					
Monsoon	2	1.5	1,560	1.8					
Tebuconazole	2	1.5	1,453	1.7					
Evito	1	0.8	1,350	1.6					
Proline	2	1.5	1,318	1.5					
Quadris/Amstar	2	1.5	1,250	1.5					
Headline	3	2.3	866	1					
Oxidate	1	0.8	650	0.8					
Miravis Top	1	0.8	300	0.3					
Delaro	1	0.8	215	0.3					
Tebucure	1	0.8	124	0.1					
Fungicide Total			107,382						

^aRespondents' acres only. Includes acreage treated more than once with the same product.

^bPercentages 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.

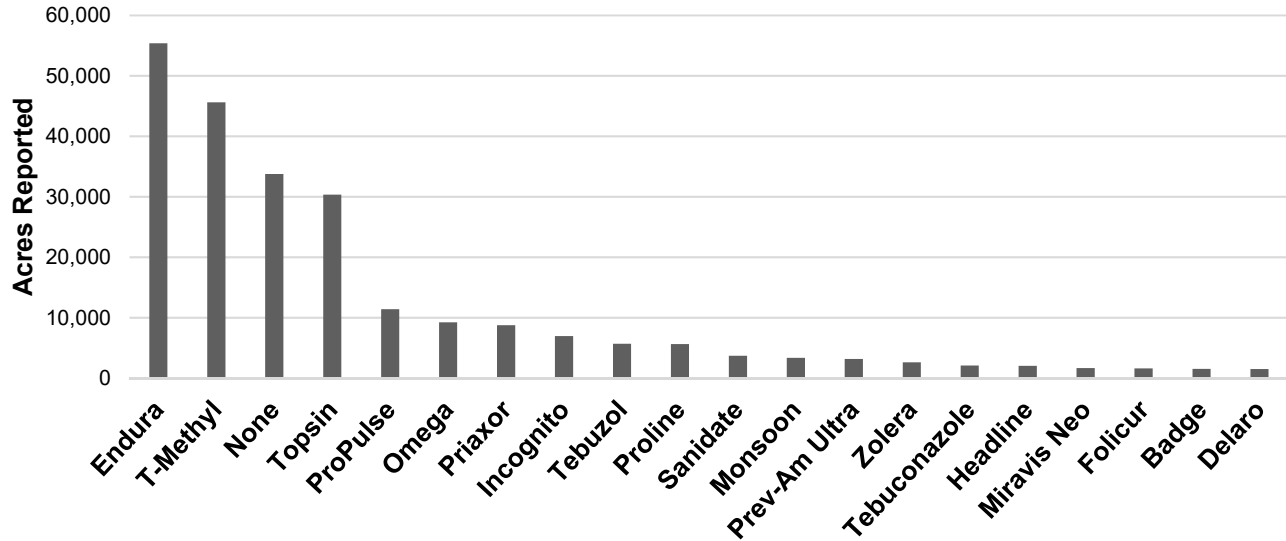


Figure 21. Northharvest foliar fungicide use in dry beans in 2022 (20 most frequently used products only).

Table 32. In-furrow fungicide use in dry beans in 2022.

Fungicide	Respondents (no.)	Respondents (%)	Total acres treated (no.) ^a	Total acres treated (%) ^a
Minnesota				
None	81	94.2	40,248	93
AZteroid	2	2.3	1,070	2.5
Serenade	2	2.3	1,051	2.4
Headline	2	2.3	925	2.1
Xanthion	1	1.2	911	2.1
Fungicide Total			3,957	
North Dakota				
None	130	99.2	83,154	97.8
Cercobin	1	0.8	1,500	1.8
Meteor	1	0.8	290	0.3
AZteroid	1	0.8	80	0.1
Fungicide Total			1,870	
Northharvest				
None	211	97.2	123,402	96.2
Cercobin	1	0.5	1,500	1.2
AZteroid	3	1.4	1,150	0.9
Serenade	2	0.9	1,051	0.8
Headline	2	0.9	925	0.7
Xanthion	1	0.5	911	0.7
Meteor	1	0.5	290	0.2
Fungicide Total			5,827	

^aRespondents' acres only.

Table 33. Fungicide seed treatment use in dry beans in 2022.

Seed treatment	Respondents (no.)	Respondents (%) ^b	Total acres treated (no.) ^a	Total acres treated (%) ^{a,b}
Minnesota				
Cruiser Maxx	43	48.9	25,557	54.4
Apron Maxx	11	12.5	9,219	19.6
Don't know	20	22.7	8,786	18.7
Rancona	9	10.2	8,762	18.6
Maxim	7	8	7,390	15.7
Heads Up	11	12.5	6,991	14.9
Apron, Apron XL	7	8	4,752	10.1
Vibrance	8	9.1	4,527	9.6
Cruiser Maxx Vibrance	6	6.8	4,383	9.3
None	13	14.8	3,989	8.5
Dynasty	2	2.3	2,350	5
Vibrance Trio	1	1.1	2,114	4.5
Vibrance Maxx	3	3.4	1,650	3.5
DynaShield	2	2.3	1,110	2.4
Captan	1	1.1	935	2
Stamina	1	1.1	800	1.7
Thiram	1	1.1	540	1.1
Seed Treatment Total			89,866	
North Dakota				
Cruiser Maxx	38	29.2	21,244	25.1
Don't know	27	20.8	17,460	20.6
None	27	20.8	14,546	17.2
Apron, Apron XL	10	7.7	10,868	12.8
Rancona	12	9.2	9,817	11.6
Maxim	12	9.2	9,542	11.3
Cruiser Maxx Vibrance	12	9.2	9,458	11.2
Vibrance	9	6.9	8,867	10.5
Vibrance Maxx	8	6.2	7,031	8.3
Apron Maxx	9	6.9	5,658	6.7
Heads Up	6	4.6	3,619	4.3
Dynasty	2	1.5	1,681	2
Rancona Summit	1	0.8	1,300	1.5
Prevail	1	0.8	100	0.1
Seed Treatment Total			106,645	
Northarvest				
Cruiser Maxx	81	37.2	46,801	35.5
Don't know	47	21.6	26,246	19.9
Rancona	21	9.6	18,579	14.1
None	40	18.3	18,535	14.1
Maxim	19	8.7	16,932	12.9
Apron, Apron XL	17	7.8	15,620	11.9
Apron Maxx	20	9.2	14,877	11.3
Cruiser Maxx Vibrance	18	8.3	13,841	10.5
Vibrance	17	7.8	13,394	10.2
Heads Up	17	7.8	10,610	8.1
Vibrance Maxx	11	5	8,681	6.6
Dynasty	4	1.8	4,031	3.1
Vibrance Trio	1	0.5	2,114	1.6
Rancona Summit	1	0.5	1,300	1
DynaShield	2	0.9	1,110	0.8
Captan	1	0.5	935	0.7
Stamina	1	0.5	800	0.6
Thiram	1	0.5	540	0.4
Prevail	1	0.5	100	0.1
Seed Treatment Total			196,511	

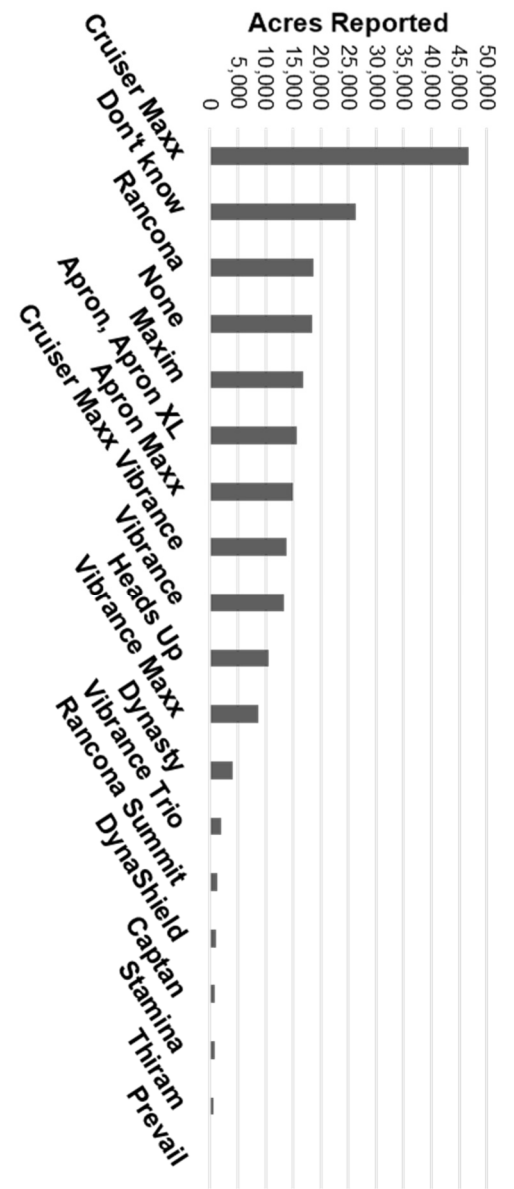


Figure 22. Northarvest fungicide seed treatment use in dry beans in 2022.

^aRespondents' acres only. Includes acreage treated with more than one product.

^bPercentages do not total 100% because some respondents treated the same acreage with more than one product.

Weeds and Herbicide Use

Table 34. Worst weed problem in dry beans in 2022.

Weed ^a	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
Lambsquarters	18	20.7	13,974	29.8
Waterhemp	32	36.8	10,616	22.7
Ragweed	13	14.9	7,291	15.6
Redroot pigweed	6	6.9	4,415	9.4
Nightshade	3	3.4	2,480	5.3
Powell amaranth	1	1.1	1,800	3.8
Cocklebur	5	5.7	1,650	3.5
Kochia	2	2.3	1,295	2.8
Quackgrass	1	1.1	1,230	2.6
Foxtail (pigeon grass)	3	3.4	1,123	2.4
Canada thistle	1	1.1	530	1.1
None	1	1.1	300	0.6
Downy brome (cheatgrass)	1	1.1	144	0.3
Total	87	100	46,848	100
North Dakota				
Kochia	45	35.7	32,910	40.2
Ragweed	13	10.3	11,052	13.5
Waterhemp	14	11.1	8,957	10.9
Lambsquarters	12	9.5	6,143	7.5
Redroot pigweed	8	6.3	4,745	5.8
Foxtail (pigeon grass)	7	5.6	4,481	5.5
Wild mustard	3	2.4	2,636	3.2
Biennial wormwood	3	2.4	2,405	2.9
None	4	3.2	1,615	2
Volunteer grain	2	1.6	1,323	1.6
Powell amaranth	1	0.8	1,240	1.5
Horseweed	4	3.2	951	1.2
Stinkgrass	1	0.8	711	0.9
Nightshade	2	1.6	695	0.8
Wild oats	2	1.6	695	0.8
Wild buckwheat	1	0.8	625	0.8
Canada thistle	3	2.4	407	0.5
Marshelder	1	0.8	290	0.4
Total	126	100	81,881	100
Northarvest				
Kochia	47	22.1	34,205	26.6
Lambsquarters	30	14.1	20,117	15.6
Waterhemp	46	21.6	19,573	15.2
Ragweed	26	12.2	18,343	14.2
Redroot pigweed	14	6.6	9,160	7.1
Foxtail (pigeon grass)	10	4.7	5,604	4.4
Nightshade	5	2.3	3,175	2.5
Powell amaranth	2	0.9	3,040	2.4
Wild mustard	3	1.4	2,636	2
Biennial wormwood	3	1.4	2,405	1.9
None	5	2.3	1,915	1.5
Cocklebur	5	2.3	1,650	1.3
Volunteer grain	2	0.9	1,323	1
Quackgrass	1	0.5	1,230	1
Horseweed	4	1.9	951	0.7
Canada thistle	4	1.9	937	0.7
Stinkgrass	1	0.5	711	0.6
Wild oats	2	0.9	695	0.5
Wild buckwheat	1	0.5	625	0.5
Marshelder	1	0.5	290	0.2
Downy brome (cheatgrass)	1	0.5	144	0.1
Total	213	100	128,729	100

^aRanked as No. 1 weed problem by respondents.

^bRespondents' acres only.

^cWeed problem may not have been present across all reported acres.

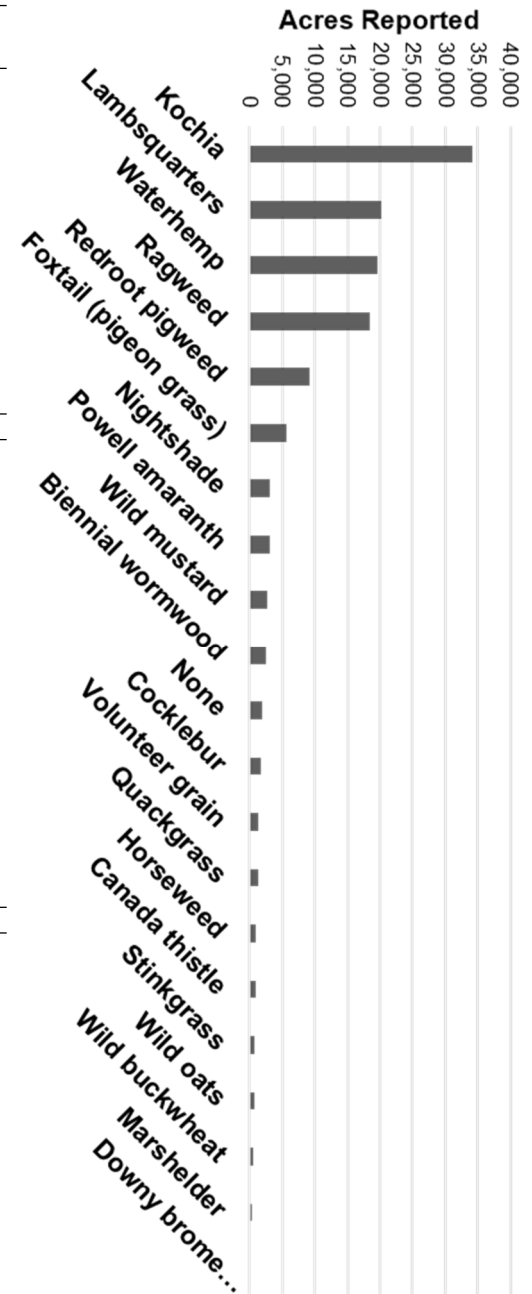


Figure 23. Northarvest worst weed problem in dry beans in 2022.

Table 35. Weeds ranked as one of the three worst in dry beans in 2022.

Weed ^a	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^b	Acres reported (%) ^b	Weed ^a	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^b	Acres reported (%) ^b
Minnesota					Northarvest				
Lambsquarters	61	70.1	34,807	74.3	Lambsquarters	105	49.3	63,938	49.7
Ragweed	36	41.4	22,434	47.9	Kochia	83	39	53,345	41.4
Waterhemp	47	54	18,951	40.5	Ragweed	66	31	46,417	36.1
Red. pigweed	31	35.6	15,343	32.8	Red. pigweed	67	31.5	42,871	33.3
Nightshade	16	18.4	9,929	21.2	Waterhemp	75	35.2	38,380	29.8
Kochia	10	11.5	6,736	14.4	Foxtail	23	10.8	14,069	10.9
Buckwheat	6	6.9	4,094	8.7	Nightshade	22	10.3	13,716	10.7
Vol. grain	3	3.4	2,954	6.3	Bi. wormwood	21	9.9	12,859	10
Cocklebur	9	10.3	2,943	6.3	Buckwheat	19	8.9	12,449	9.7
Pros. pigweed	2	2.3	2,734	5.8	Canada thistle	27	12.7	11,566	9
Sunflower	2	2.3	2,308	4.9	Vol. grain	12	5.6	10,376	8.1
Bi. wormwood	3	3.4	1,945	4.2	Cocklebur	18	8.5	8,373	6.5
Foxtail	5	5.7	1,909	4.1	Wild oats	11	5.2	6,811	5.3
Pwl. amaranth	1	1.1	1,800	3.8	Pros. pigweed	8	3.8	6,583	5.1
Canada thistle	6	6.9	1,779	3.8	Horseweed	12	5.6	6,066	4.7
Quackgrass	3	3.4	1,610	3.4	Wild mustard	7	3.3	5,603	4.4
Wild mustard	2	2.3	1,147	2.4	Pwl. amaranth	5	2.3	5,071	3.9
Smartweed	1	1.1	635	1.4	Smartweed	3	1.4	2,488	1.9
None	1	1.1	300	0.6	Sunflower	2	0.9	2,308	1.8
Nutsedge	1	1.1	160	0.3	Quackgrass	4	1.9	2,137	1.7
Downy brome	1	1.1	144	0.3	None	5	2.3	1,915	1.5
Venice mallow	1	1.1	25	0.1	Downy brome	2	0.9	769	0.6
North Dakota									
Kochia	73	57.9	46,609	56.9	Stinkgrass	1	0.5	711	0.6
Lambsquarters	44	34.9	29,131	35.6	Venice mallow	2	0.9	611	0.5
Red. pigweed	36	28.6	27,528	33.6	Dandelion	1	0.5	502	0.4
Ragweed	30	23.8	23,983	29.3	Black medic	1	0.5	500	0.4
Waterhemp	28	22.2	19,429	23.7	Marshelder	1	0.5	290	0.2
Foxtail	18	14.3	12,160	14.9	Bindweed	1	0.5	215	0.2
Bi. wormwood	18	14.3	10,914	13.3	Nutsedge	1	0.5	160	0.1
Canada thistle	21	16.7	9,787	12	Vol. canola	1	0.5	157	0.1
Buckwheat	13	10.3	8,355	10.2					
Vol. grain	9	7.1	7,422	9.1					
Wild oats	11	8.7	6,811	8.3					
Horseweed	12	9.5	6,066	7.4					
Cocklebur	9	7.1	5,430	6.6					
Wild mustard	5	4	4,456	5.4					
Pros. pigweed	6	4.8	3,849	4.7					
Nightshade	6	4.8	3,787	4.6					
Pwl. amaranth	4	3.2	3,271	4					
Smartweed	2	1.6	1,853	2.3					
None	4	3.2	1,615	2					
Stinkgrass	1	0.8	711	0.9					
Downy brome	1	0.8	625	0.8					
Venice mallow	1	0.8	586	0.7					
Quackgrass	1	0.8	527	0.6					
Dandelion	1	0.8	502	0.6					
Black medic	1	0.8	500	0.6					
Marshelder	1	0.8	290	0.4					
Bindweed	1	0.8	215	0.3					
Vol. canola	1	0.8	157	0.2					

^aRanked as No. 1, 2 or 3 weed by respondents.

^bRespondents' acres only.

^cWeed problem may not have been present across all reported acres.

Figure 24. Northarvest weeds (20 most common) ranked as one of the three worst in dry beans in 2022.

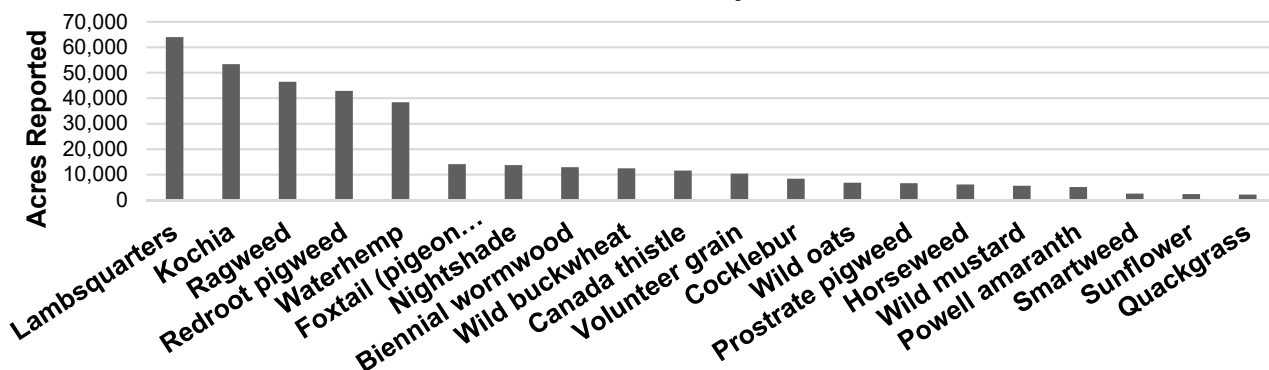
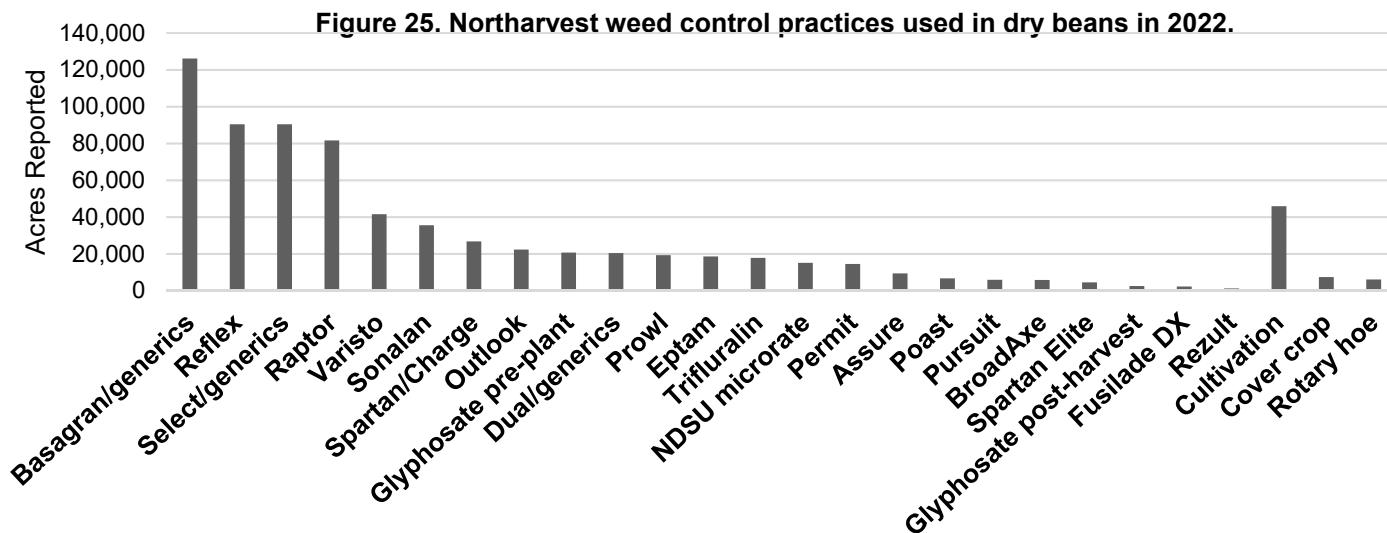


Table 36. Weed control practices used in dry beans in 2022.

Herbicide or other practice	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^a	Acres reported (%) ^b	Herbicide or other practice	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^a	Acres reported (%) ^b
Minnesota					Northharvest				
Basagran/generics	64	73.6	49,146	104.9	Basagran/generics	152	70.7	126,107	96.4
Reflex	50	57.5	31,934	68.2	Reflex	133	61.9	90,370	69.1
Raptor	46	52.9	29,887	63.8	Select/generics	106	49.3	90,364	69
Select/generics	37	42.5	29,487	62.9	Raptor	113	52.6	81,624	62.4
Varisto	25	28.7	16,516	35.3	Varisto	65	30.2	41,576	31.8
Outlook	35	40.2	15,003	32	Sonalan	67	31.2	35,546	27.2
Eptam	25	28.7	14,080	30.1	Spartan/Charge	41	19.1	26,777	20.5
Prowl	21	24.1	10,845	23.1	Outlook	49	22.8	22,299	17
Sonalan	23	26.4	10,571	22.6	Glyphosate pre	34	15.8	20,696	15.8
Permit	14	16.1	10,161	21.7	Dual/generics	29	13.5	20,392	15.6
Dual/generics	19	21.8	9,530	20.3	Prowl	33	15.3	19,253	14.7
Trifluralin	22	25.3	9,113	19.5	Eptam	30	14	18,610	14.2
Poast	2	2.3	2,995	6.4	Trifluralin	34	15.8	17,851	13.6
Glyphosate pre	7	8	2,062	4.4	NDSU microrate ^c	7	3.3	15,150	11.6
Fusilade DX	7	8	1,962	4.2	Permit	23	10.7	14,543	11.1
NDSU microrate ^c	1	1.1	1,840	3.9	Assure	18	8.4	9,354	7.1
Rezult	2	2.3	1,205	2.6	Poast	6	2.8	6,717	5.1
Spartan/Charge	3	3.4	762	1.6	Pursuit	8	3.7	5,891	4.5
Assure	5	5.7	754	1.6	BroadAxe	10	4.7	5,825	4.5
Pursuit	1	1.1	40	0.1	Spartan Elite	8	3.7	4,542	3.5
Herbicide Total			247,893		Glyphosate postharv	3	1.4	2,508	1.9
Cultivation	22	25.3	19,217	41	Fusilade DX	8	3.7	2,262	1.7
Cover crop	8	9.2	5,191	11.1	Rezult	2	0.9	1,205	0.9
Rotary hoe	2	2.3	2,101	4.5	Herbicide Total			679,462	
Manual labor	12	13.8	2,057	4.4	Cultivation	44	20.5	45,856	35
Non-herbicide Total			28,566		Cover crop	12	5.6	7,379	5.6
Weed Control Total			276,459		Rotary hoe	8	3.7	6,043	4.6
North Dakota					Manual labor	15	7	2,467	1.9
Basagran/gens	88	68.8	76,961	91.6	Non-herbicide Total			61,745	
Select/generics	69	53.9	60,877	72.5	Weed Control Total			741,207	
Reflex	83	64.8	58,436	69.6	<p>^aRespondents' acres only. Includes acreage treated more than once with the same product. ^bPercentages 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. ^cNDSU micro-rate is a reduced-rate tank mix of Basagran, Raptor, Reflex and Select.</p>				
Raptor	67	52.3	51,737	61.6					
Spartan/Charge	38	29.7	26,015	31					
Varisto	40	31.3	25,060	29.8					
Sonalan	44	34.4	24,975	29.7					
Glyphosate pre	27	21.1	18,634	22.2					
NDSU microrate ^c	6	4.7	13,310	15.8					
Dual/generics	10	7.8	10,862	12.9					
Trifluralin	12	9.4	8,738	10.4					
Assure	13	10.2	8,600	10.2					
Prowl	12	9.4	8,408	10					
Outlook	14	10.9	7,296	8.7					
Pursuit	7	5.5	5,851	7					
BroadAxe	10	7.8	5,825	6.9					
Spartan Elite	8	6.3	4,542	5.4					
Eptam	5	3.9	4,530	5.4					
Permit	9	7	4,382	5.2					
Poast	4	3.1	3,722	4.4					
Glyphosate postharv	3	2.3	2,508	3					
Fusilade DX	1	0.8	300	0.4					
Herbicide Total			431,569						
Cultivation	22	17.2	26,639	31.7					
Rotary hoe	6	4.7	3,942	4.7					
Cover crop	4	3.1	2,188	2.6					
Manual labor	3	2.3	410	0.5					
Non-herbicide Total			33,179						
Weed Control Total			464,748						



Scouting and Threshold Practices

Table 37. Scouting practices in dry beans in 2022.

	Insects		Diseases		Weeds	
	Respon- dents (no.)	Respon- dents (%)	Respon- dents (no.)	Respon- dents (%)	Respon- dents (no.)	Respon- dents (%)
Minnesota						
Crop consultant	44	50	46	52.3	41	46.6
Grower	35	39.8	34	38.6	38	43.2
Both	8	9.1	8	9.1	9	10.2
Don't scout	1	1.1	0	0	0	0
Total	88	100	88	100	88	100
North Dakota						
Crop consultant	57	43.2	58	43.9	56	42.4
Grower	61	46.2	59	44.7	60	45.5
Both	13	9.8	15	11.4	16	12.1
Don't scout	1	0.8	0	0	0	0
Total	132	100	132	100	132	100
Northharvest						
Crop consultant	101	45.9	104	47.3	97	44.1
Grower	96	43.6	93	42.3	98	44.5
Both	21	9.5	23	10.5	25	11.4
Don't scout	2	0.9	0	0	0	0
Total	220	100	220	100	220	100

Table 38. Use of economic thresholds for insects in dry beans in 2022.

	Respondents (no.)	Respondents (%)
Minnesota		
Yes	85	96.6
Sometimes	2	2.3
No	1	1.1
Total	88	100
North Dakota		
Yes	125	94.7
Sometimes	4	3
No	3	2.3
Total	132	100
Northharvest		
Yes	210	95.5
Sometimes	6	2.7
No	4	1.8
Total	220	100

References

Bradley, C.A., and Luecke, J.L. 2004. 2002 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. PP1265.

Knodel, J.J., Beauzay, P.B., Ebert, M., Endres, G.J., Franzen, D.W., Ikley, J., Kandel, H.J., Markell, S.G., and Osorno, J.M. 2022. 2021 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E2052.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Ikley, J., Kandel, H.J., Markell, S.G., Osorno, J.M., and Pasche, J.S. 2021. 2020 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E2014.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Ikley, J., Kandel, H.J., Markell, S.G., Osorno, J.M., and Pasche, J.S. 2020. 2019 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1952.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Ikley, J., Kandel, H.J., Markell, S.G., Osorno, J.M., and Pasche, J.S. 2019. 2018 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1902.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., Pasche, J.S., and Zollinger, R.K. 2018. 2017 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1884.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., Pasche, J.S., and Zollinger, R.K. 2017. 2016 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1841.

Knodel, J.J., Beauzay, P.B., Endres, G.J., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., Pasche, J.S., and Zollinger, R.K. 2016. 2015 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1802.

Knodel, J.J., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., Pasche, J.S., and Zollinger, R.K. 2015. 2014 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1750.

Knodel, J.J., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., Pasche, J.S., and Zollinger, R.K. 2014. 2013 Dry Bean Grower Survey of Production, Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1710.

Knodel, J.J., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2013. 2012 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1640.

Knodel, J.J., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2012. 2011 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1602.

Knodel, J.J., Luecke, J.L., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2011. 2010 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1522 (revised).

Knodel, J.J., Luecke, J.L., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2010. 2009 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1421 (revised).

Knodel, J.J., Luecke, J.L., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2009. 2008 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. E1421 (revised).

Knodel, J.J., Luecke, J.L., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2008. 2007 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. PP1392.

Knodel, J.J., Luecke, J.L., Beauzay, P.B., Franzen, D.W., Kandel, H.J., Markell, S.G., Osorno, J.M., and Zollinger, R.K. 2008. 2006 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. PP1265 (revised).

Knodel, J.J., Bradley, C.A., Luecke, J.L., and Mars, G.A. 2008. 2004 and 2005 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. PP1265 (revised).

Lamey, H.A., Berglund, D.R., McMullen, M.P., Luecke, J.L., Venette, J.R., McBride, D.K., Zollinger, R.K., and Grafton, K.F. 1993. 1991 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 13.

Lamey, H.A., Berglund, D.R., McMullen, M.P., Luecke, J.L., Zollinger, R.K., Glogoza, P.A., Venette, J.R., McBride, D.K., and Grafton, K.F. 1994. 1992 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 19.

Lamey, H.A., Berglund, D.R., McMullen, M.P., Zollinger, R.K., Venette, J.R., McBride, D.K., Venette, S.J., and Venette, R.C. 1992. 1990 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 10.

Lamey, H.A., Dexter, A.G., McBride, D.K., Venette, R.C., and Venette, J.R. 1990. Problems and Practices of Northharvest Dry Bean Growers in 1988. N.D. Farm Res. 48(20):6-11, 14.

Lamey, H.A., McMullen, M.P., Glogoza, P.A., Zollinger, R.K., Luecke, J.L., Berglund, D.R., Venette, J.R., and Grafton, K.F. 1998. 1996 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 44.

Lamey, H.A., Zollinger, R.K., Luecke, J.L., Berglund, D.R., Glogoza, P.A., and Grafton, K.F. 2001. 2000 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 72.

Lamey, H.A., Zollinger, R.K., McBride, D.K., Venette, R.C., and Venette, J.R. 1991. Production Problems and Practices of Northharvest Dry Bean Growers in 1989. N.D. Farm Res. 29(2):17-24.

- Lamey, H.A., Zollinger, R.K., McMullen, M.P., Luecke, J.L., Grafton, K.F., Berglund, D.R., Venette, J.R., and Glogoza, P.A. 1996. 1994 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 28.
- Lamey, H.A., Zollinger, R.K., Venette, J.R., Berglund, D.R., Luecke, J.L., Grafton, K.F., and Glogoza, P.A. 1997. 1995 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 33.
- Lamey, H.A., Zollinger, R.K., Venette, J.R., McMullen, M.P., Luecke, J.L., Glogoza, P.A., Grafton, K.F., and Berglund, D.R. 1999. 1997 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 47.
- Lamey, H.A., Zollinger, R.K., McMullen, M.P., Luecke, J.L., Venette, J.R., Berglund, D.R., Grafton, K.F., and Glogoza, P.A. 1999. 1998 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 58.
- Lamey, H.A., Zollinger, R.K., McMullen, M.P., Luecke, J.L., Venette, J.R., Berglund, D.R., Grafton, K.F., and Glogoza, P.A. 2000. 1999 Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota. NDSU Extension Rpt. 64.
- Venette, J.R., Lamey, H.A., Peterson, D.E., and Venette, R.C. 1989. Problems and Practices of Dry Edible Bean Production in North Dakota and Minnesota, 1987. N.D. Farm Res. 46(5):25-31.

Appendix I.

PLEASE COMPLETE ALL REQUESTED INFORMATION IN THE FOLLOWING TABLES FOR YOUR 2022 DRY BEAN CROP

Dry Bean Production in 2022		
State	County	Dry Bean Acres Planted
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 Planted in 2022		
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	

Dry Bean Classes, Varieties and Acres Planted in 2022		
Bean Class	Variety	Acres
	Foxfire	
	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	
	AC Portage	
	Alpena	
	Apex	
	Armada	
	Blizzard	
	Ensign	
	Medalist	
	ND Polar	
	SV1893GH	
	T-9905	
	Valiant	
	Other navy (please specify)	
	Pink	Coral
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 Planted in 2022		
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 Planted in 2022		
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 2022. Space is provided for up to three bean classes.	
Production Problem	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 problems	
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	
Wildlife damage	
Wind damage	
Other problems (please specify)	

Agronomy

Please list row spacing, seeding rate and established stand for each bean class you planted in 2022.			
Bean Class	Row Spacing (inches)	Seeding Rate (seeds per acre)	Established Stand (plants per acre)

Please list the crops in your dry bean crop rotation program for all fields you planted to dry bean in 2022.	
Year	List of Crops
2021	
2020	
2019	
2018	

Please list acreage for each tillage type listed below for your dry bean fields in 2022.			
Tillage Type	Acreage	Tillage Type	Acreage
Conventional		Strip-till	
Minimum		No-till	

Cover Crops in Dry Beans in 2022. Please answer the questions in the table below.		
Did you use a cover crop on your dry bean ground in 2022?		
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 _____		

Please indicate pounds per acre for fertilizer components in dry beans in 2022 and answer the fertility questions .				
Nitrogen	Phosphate	Potash	Zinc	Sulfur
Did you inoculate with <i>Rhizobium</i> ?			Yes	No
If you inoculated, did you use a dry bean specific inoculant (<i>Rhizobium phaseolus</i>)?			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 2022? (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 2022?					
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

Insecticides and Insect Pests

Foliar Insecticides Used on Dry Beans in 2022. 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
Foliar Insecticide Products		
1. Acephate/Orthene	8. Declare	15. Transform
2. Asana XL	9. Dimethoate	16. Voliam Xpress
3. Baythroid XL	10. Hero	17. Warrior/generics
4. Besiege	11. Mustang Maxx	18. None used
5. Blackhawk	12. Sevin	19. Other (specify)
6. Brigade/generics	13. Sivanto Prime	
7. Coragen	14. Tombstone	

Seed Treatment Insecticides Used on Dry Beans in 2022. 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. Don't know
3. Cruiser 5FS	9. None used
4. Cruiser Maxx	10. Other (specify)
5. Dyna-Shield Imidacloprid 5	
6. Enhance AW	

Worst Insect/Mite Problem in Dry Beans in 2022. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.	
Insect/Mite	Rank
Aphids	
Amyworms	
Bean leaf beetle	
Cutworms	
Foliage caterpillars	
Grasshoppers	
Leafhoppers	
Seed corn maggot	
Spider mites	
Wireworms	
None	

Fungicides and Disease Problems

Foliar Fungicides Used on Dry Beans in 2022. 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
Foliar Fungicide Products		
1. None used	24. Incognito	47. Quash
2. Aframe	25. Kenja	48. Quilt
3. Aproach	26. Kocide	49. Ranman
4. Aprovia Top	27. Mastercop	50. Revytek
5. Arius Adv	28. Meteor	51. Rovral
6. AZternknot	29. Microthiol	52. Sanidate
7. AZteroid (in-furrow)	30. Miravis Neo	53. Satori
8. Badge	31. Miravis Top	54. Serenade
9. Basicop	32. Monsoon	55. Switch
10. Bravo	33. Nevado	56. Tebucure
11. Cannonball	34. Omega	57. Tebuzol
12. Cercobin	35. Onset	58. Tetraban
13. Champ	36. Orius	59. T-methyl
14. ChampION	37. Oxidate	60. Topsin
15. Cuprofix	38. Oxiphos	61. Vabro
16. Delaro	39. Phostrol	62. Veltyma
17. Echo	40. Praiz	63. Vertisan
18. Endura	41. Priaxor	64. Viathon
19. Equation	42. Proline	65. Xanthion (in-furrow)
20. Equus	43. ProPulse	66. Zolera
21. Evito	44. Provysol	67. Other (specify)
22. Fontelis	45. Quadris	
23. Headline	46. Quadris Opti	

In-furrow Fungicide Applications Made on Dry Beans in 2022. 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 2022. 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	13. Maxim	25. Spirato
2. Apron Maxx	14. Mertect	26. Stamina
3. Apron XL	15. Obvious	27. Thiram
4. Belmont	16. Obvious Plus	28. Vibrance
5. Captan	17. Precinct	29. Vibrance Maxx
6. Chloroneb	18. Prevail	30. Vibrance Trio
7. Cruiser Maxx	19. Rancona	31. Vitaflo
8. Cruiser Maxx Vibrance	20. Rancona Summit	32. Vitavax
9. Dyna-Shield	21. Rizolex	33. None used
10. Dynasty	22. Saxony	34. Don't know
11. EverGol Energy	23. Sebring	35. Other (specify)
12. Heads Up	24. Signet	

Worst Disease Problem in Dry Beans in 2022. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.	
Disease	Rank
Anthracnose	
Bacterial brown spot	
Bacterial wilt	
Bean common mosaic virus	
Common bacterial blight	
Halo blight	
Other viruses (general)	
Root rot	
Rust	
White mold	
None	

Field Scouting

Field Scouting in Dry Beans in 2022. 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

