



E1902 (March 2019)

2018 DRY BEAN Grower Survey

*of Production, Pest Problems
and Pesticide Use*

in Minnesota and North Dakota

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

North Dakota State University

*In cooperation with the
Northharvest Bean Growers Association*

NDSU | EXTENSION

North Dakota State University, Fargo, ND

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 2018.....	5
Table 2. Dry bean production by county in 2018.....	5
Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground and damaged by water in 2018.....	6
Table 4. Dry bean market classes grown in 2018.....	6
Table 5. Dry bean varieties grown in 2018.....	7
Table 6. Dry bean production problems reported in 2018.....	8
Table 7. Dicamba drift injury on dry bean acreage reported in 2018.....	9
Table 8. Reported yield loss due to dicamba drift injury on dry beans in 2018.....	9
Table 9. Purchased seed size problems that affected acreage planting intentions in 2018.....	9
Table 10. Row spacing by dry bean market class in 2018.....	10
Table 11. Seeding rate by dry bean market class in 2018.....	10
Table 12. Percent of total dry bean acres harvested by direct combining in 2018.....	11
Table 13. Estimated yield loss in harvested dry beans in 2018.....	11
Table 14. Dry bean field tillage practices in 2018.....	12
Agronomy	12
Table 15. Cover crop use on dry bean fields in 2018.....	12
Table 16. Reasons for cover crop use on dry bean fields in 2018.....	12
Table 17. Seasonal use of cover crops on dry bean fields in 2018.....	13
Table 18. Cover crop species composition on dry bean fields in 2018.....	13
Table 19. Ground rolling on dry bean fields in 2018.....	14
Table 20. Ground rolling and direct harvest on dry bean fields in 2018.....	14
Table 21. Use of fertilizers on dry bean fields in 2018.....	15
Table 22. Fertilizer application methods on dry bean fields in 2018.....	15
Table 23. Use of soil test prior to fertilization of dry bean fields in 2018.....	15
Table 24. Use of Rhizobium inoculants on dry bean fields in 2018.....	16
Table 25. Use of site-specific nutrient management (SSNM) on dry bean fields in 2018.....	16
Table 26. Desiccants used on dry beans in 2018.....	17
Table 27. Desiccant tank-mixes used on dry beans in 2018.....	17
Table 28. Frequency of previous crops (2014 - 2017) in fields planted to dry bean in 2018.....	18
Table 29. Number of years dry beans are grown in dry bean crop rotation program.....	18
Insect Pests and Insecticide Use	19
Table 30. Worst insect problem in dry beans in 2018.....	19
Table 31. Insects ranked as one of the three worst in dry beans in 2018.....	20
Table 32. Foliar insecticide use in dry beans in 2018.....	21
Table 33. Soil insecticide and seed treatment use in dry beans in 2018.....	22
Plant Diseases and Fungicide Use	23
Table 34. Worst disease problem in dry beans in 2018.....	23
Table 35. Diseases ranked as one of the three worst in dry beans in 2018.....	24
Table 36. Foliar fungicide use in dry beans in 2018.....	25
Table 37. In-furrow fungicide use in dry beans in 2018.....	26
Table 38. Fungicide seed treatment use in dry beans in 2018.....	27
Weeds and Herbicide Use	28
Table 39. Worst weed problem in dry beans in 2018.....	28
Table 40. Weeds ranked as one of the three worst in dry beans in 2018.....	29
Table 41. Weed control practices used in dry beans in 2018.....	30
Scouting and Threshold Practices	31
Table 42. Scouting practices in dry beans in 2018.....	31
Table 43. Use of economic thresholds for insects in dry beans in 2018.....	31
References	32
APPENDIX I	34

List of Figures

Figure 1.	Northharvest dry bean acres planted by state in 2018	5
Figure 2.	Northharvest dry bean production by county in 2018	5
Figure 3.	Northharvest respondents' reported acres from Table 3.....	6
Figure 4.	Northharvest dry bean market classes grown in 2018	6
Figure 5.	Northharvest respondents' reported acres for dry bean production problems in 2018.....	8
Figure 6.	Northharvest percent of dry bean acres harvested by direct combining in 2018.....	12
Figure 7.	Northharvest estimated yield loss in harvested dry beans in 2018	12
Figure 8.	Northharvest dry bean field tillage practices in 2018.....	13
Figure 9.	Northharvest ground rolling on dry bean fields in 2018.....	14
Figure 10.	Northharvest use of fertilizers on dry bean fields in 2018.....	15
Figure 11.	Northharvest fertilizer application methods on dry bean fields in 2018	15
Figure 12.	Northharvest use of soil test in 2018	15
Figure 13.	Northharvest use of inoculant in 2018	16
Figure 14.	Northharvest use of site-specific nutrient management in 2018.....	16
Figure 15.	Northharvest desiccants used on dry beans in 2018.....	17
Figure 16.	Northharvest number of years dry beans are grown in dry bean crop rotation program	18
Figure 17.	Northharvest worst insect problem in dry beans in 2018.....	19
Figure 18.	Northharvest insects ranked as one of the three worst in dry beans in 2018.....	20
Figure 19.	Northharvest foliar insecticide use in dry beans in 2018	21
Figure 20.	Northharvest insecticide seed treatment and soil insecticide use in dry beans in 2018.....	22
Figure 21.	Northharvest worst disease problem in dry beans in 2018.....	23
Figure 22.	Northharvest diseases ranked as one of the three worst in dry beans in 2018.....	24
Figure 23.	Northharvest foliar fungicide use in dry beans in 2018.....	26
Figure 24.	Northharvest fungicide application method in dry beans in 2018.....	26
Figure 25.	Northharvest in-furrow fungicide use in dry beans in 2018	26
Figure 26.	Northharvest fungicide seed treatment use in dry beans in 2018	27
Figure 27.	Northharvest worst weed problem in dry beans in 2018	28
Figure 28.	Northharvest weeds ranked as one of the three worst in dry beans in 2018.....	29
Figure 29.	Northharvest weed control practices used in dry beans in 2018.....	31

Introduction

The 2018 dry bean grower survey is the 29th 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 2004-2017 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 (e.g. 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.

Production

Table 1. Number of Northharvest dry bean growers responding, acres planted by respondents and total state acres in 2018.

Growers	No. of respondents	Respondents' acres	Total acres ^a	Acres surveyed (% of total)
Minnesota	95	36,074	175,000	20.6
North Dakota	146	87,074	635,000	13.7
Northharvest	241	123,148	810,000	15.2

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

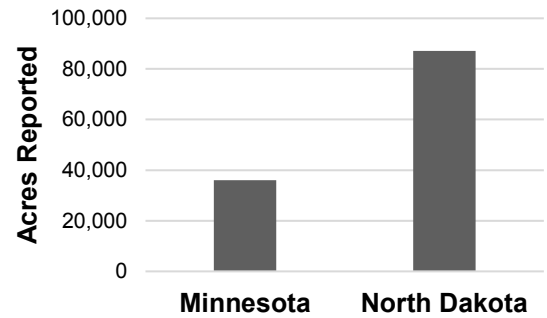


Figure 1. Northharvest dry bean acres planted by state in 2018 (respondents' acres only).

Table 2. Dry bean production by county in 2018.

Minnesota		North Dakota			
No. of respondents ^a	Acres ^b	No. of respondents ^a	Acres ^b		
Polk	15	4,566	Grand Forks	23	12,031
Stevens	11	3,911	Pembina	19	11,679
Renville	11	3,249	Wells	10	9,667
Otter Tail	8	3,200	Walsh	30	9,419
Norman	2	3,027	Benson	9	6,884
Kandiyohi	8	2,493	Traill	10	5,823
Mahnomen	7	2,413	McLean	4	4,735
Hubbard	2	1,797	Nelson	4	4,450
Chippewa	7	1,417	Ramsey	4	2,250
Swift	5	1,303	Cass	4	2,050
Wadena	4	1,153	Steele	10	2,006
McLeod	3	1,133	Stutsman	5	1,754
Pennington	3	718	Ransom	3	1,704
Stearns	2	715	Ward	1	1,600
Morrison	3	592	Cavalier	6	1,483
Big Stone	2	520	Barnes	3	1,380
Roseau	1	500	Pierce	2	1,250
Traverse	2	430	Griggs	4	1,020
Todd	1	400	Foster	2	945
Marshall	2	387	Dickey	1	788
Kittson	1	375	LaMoure	3	774
Douglas	1	350	Towner	1	530
Grant	1	290	Sargent	1	475
Sherburne	1	260	Eddy	3	418
Pope	1	230	Emmons	1	410
Beltrami	1	200	Burleigh	1	394
Wilkin	2	162	Richland	1	350
Becker	1	110	Oliver	1	320
Meeker	1	100	Logan	1	260
Brown	1	40	Morton	2	225
Crow Wing	1	33			
Total	36,074	Total	87,074		

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

^bRespondents' acres only.

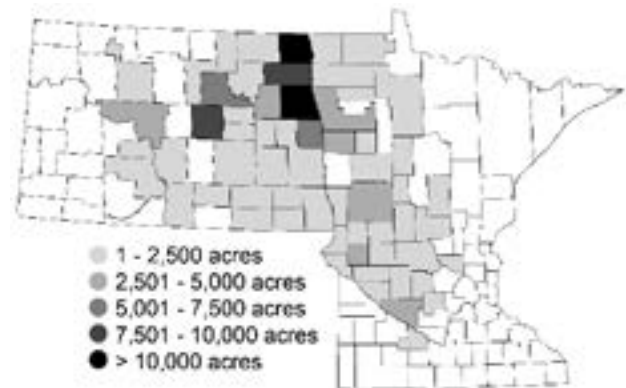


Figure 2. Northharvest dry bean production by county in 2018 (respondents' acres only).

Table 3. Dry bean acres planted, harvested, irrigated, on tile-drained ground and damaged by water in 2018.

	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Planted	36,074	100
Harvested	35,866	99.4
Irrigated	10,574	29.3
Tile-drained	11,744	32.6
Water damage (beans harvested)	7,588	21
Water damage (beans not harvested)	174	0.5
North Dakota		
Planted	87,074	100
Harvested	85,244	97.9
Irrigated	1,362	1.6
Tile-drained	5,165	5.9
Water damage (beans harvested)	1,146	1.3
Water damage (beans not harvested)	1,045	1.2
Northharvest		
Planted	123,148	100
Harvested	121,110	98.3
Irrigated	11,936	9.7
Tile-drained	16,909	13.7
Water damage (beans harvested)	8,734	7.1
Water damage (beans not harvested)	1,219	1

^aRespondents' acres only.

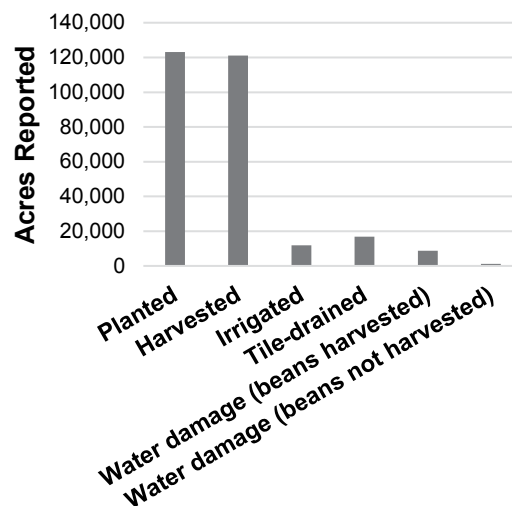


Figure 3. Northharvest respondents' reported acres from Table 3.

Table 4. Dry bean market classes grown in 2018.

Market class	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Kidney	15,539	43.1
Navy	11,283	31.3
Black	8,412	23.3
Small Red	600	1.7
Pinto	240	0.7
Cranberry	0	0
Pink	0	0
Total	36,074	100
North Dakota		
Pinto	59,949	68.8
Black	12,039	13.8
Navy	10,234	11.8
Small Red	3,431	3.9
Pink	673	0.8
Kidney	478	0.5
Cranberry	270	0.3
Total	87,074	100
Northharvest		
Pinto	60,189	48.9
Navy	21,517	17.5
Black	20,451	16.6
Kidney	16,017	13
Small Red	4,031	3.3
Pink	673	0.5
Cranberry	270	0.2
Total	123,148	100

^aRespondents' acres only.

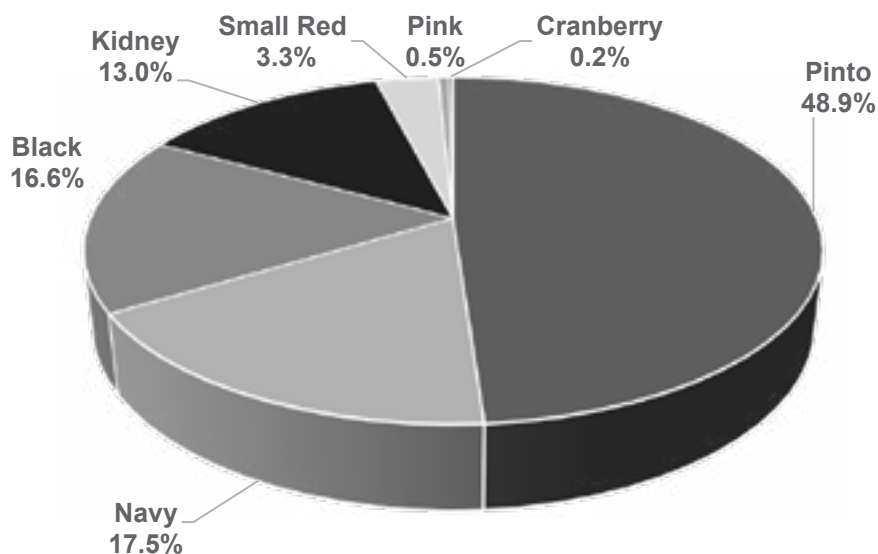


Figure 4. Northharvest dry bean market classes grown in 2018.

Table 5. Dry bean varieties grown in 2018.

Variety	Class	Acres planted ^a					
		Minnesota	% ^b	North Dakota	% ^b	Northharvest	% ^b
Eclipse	Black	5,177	14.4	8,484	9.7	13,661	11.1
Zorro	Black	2,189	6.1	1,206	1.4	3,395	2.8
Black Tails	Black	565	1.6	1,824	2.1	2,389	1.9
Black Cat	Black	341	0.9	525	0.6	866	0.7
GTS 1103	Black	100	0.3	0	0	100	0.1
Zenith	Black	40	0.1	0	0	40	0
Total Black	Black	8,412	23.3	12,039	13.8	20,451	16.6
Bellagio	Cranberry	0	0	270	0.3	270	0.2
Total Cranberry	Cranberry	0	0	270	0.3	270	0.2
Montcalm	Kidney	4,075	11.3	198	0.2	4,273	3.5
Red Hawk	Kidney	2,390	6.6	0	0	2,390	1.9
Dynasty	Kidney	1,781	4.9	0	0	1,781	1.4
Chaparral	Kidney	1,528	4.2	0	0	1,528	1.2
Clouseau	Kidney	1,496	4.1	0	0	1,496	1.2
Talon	Kidney	925	2.6	0	0	925	0.8
Red Rover	Kidney	850	2.4	0	0	850	0.7
Pink Panther	Kidney	809	2.2	0	0	809	0.7
Big Red	Kidney	566	1.6	0	0	566	0.5
Rosie	Kidney	0	0	280	0.3	280	0.2
ProVita DRK09431	Kidney	272	0.8	0	0	272	0.2
Cabernet	Kidney	210	0.6	0	0	210	0.2
Not specified	Kidney	185	0.5	0	0	185	0.2
Beluga	Kidney	160	0.4	0	0	160	0.1
ProVita DRK09434	Kidney	132	0.4	0	0	132	0.1
Epic	Kidney	80	0.2	0	0	80	0.1
Ronnie's Red	Kidney	80	0.2	0	0	80	0.1
Total Kidney	Kidney	15,539	43.1	478	0.5	16,017	13
HMS Medalist	Navy	6,347	17.6	7,174	8.2	13,521	11
T9905	Navy	4,113	11.4	1,335	1.5	5,448	4.4
Blizzard	Navy	548	1.5	1,565	1.8	2,113	1.7
Ensign	Navy	5	0	160	0.2	165	0.1
Vista	Navy	142	0.4	0	0	142	0.1
COOP 8070	Navy	68	0.2	0	0	68	0.1
Indi	Navy	40	0.1	0	0	40	0
Alpena	Navy	20	0.1	0	0	20	0
Total Navy	Navy	11,283	31.3	10,234	11.8	21,517	17.5
Floyd	Pink	0	0	523	0.6	523	0.4
Not specified	Pink	0	0	150	0.2	150	0.1
Total Pink	Pink	0	0	673	0.8	673	0.5
Vibrant (SD) ^c	Pinto	0	0	16,622	19.1	16,622	13.5
Windbreaker	Pinto	0	0	9,831	11.3	9,831	8
Monterrey	Pinto	200	0.6	7,872	9	8,072	6.6
La Paz	Pinto	0	0	7,156	8.2	7,156	5.8
ND Palomino (SD) ^c	Pinto	0	0	6,548	7.5	6,548	5.3
Torreón	Pinto	0	0	3,323	3.8	3,323	2.7
Santa Cruz	Pinto	0	0	2,665	3.1	2,665	2.2
Sinaloa	Pinto	40	0.1	1,674	1.9	1,714	1.4
Lariat	Pinto	0	0	1,190	1.4	1,190	1
Stampede	Pinto	0	0	1,005	1.2	1,005	0.8
Cowboy	Pinto	0	0	661	0.8	661	0.5
Radiant (SD) ^c	Pinto	0	0	490	0.6	490	0.4
ND307	Pinto	0	0	400	0.5	400	0.3
Rough Rider	Pinto	0	0	334	0.4	334	0.3
White Mountain (SD) ^c	Pinto	0	0	90	0.1	90	0.1
Sonora	Pinto	0	0	88	0.1	88	0.1
Total Pinto	Pinto	240	0.7	59,949	68.8	60,189	48.9
Ruby	Small Red	600	1.7	1,657	1.9	2,257	1.8
Merlot	Small Red	0	0	1,050	1.2	1,050	0.9
Viper	Small Red	0	0	724	0.8	724	0.6
Total Small Red	Small Red	600	1.7	3,431	3.9	4,031	3.3
Grand Total	All Classes	36,074	100	87,074	100	123,148	100

^aRespondents' acres only.

^bPercent of respondents' total dry bean acreage.

^c(SD) = Slow Darkening pinto variety.

Table 6. Dry bean production problems reported in 2018.

Production problem	Respondents (no.)	Respondents (%)	Acres reported (no.)^a	Acres reported (%)^a
Minnesota				
Diseases	28	29.5	7,923	22
Water damage (beans harvested)	36	37.9	7,588	21
Drought	15	15.8	5,523	15.3
No problems reported	18	18.9	5,349	14.8
Weeds	25	26.3	5,078	14.1
Harvest	13	13.7	3,166	8.8
Hail	14	14.7	2,919	8.1
Emergence	9	9.5	2,229	6.2
Insects	6	6.3	2,123	5.9
Delayed planting	2	2.1	1,125	3.1
Applied herbicide injury	5	5.3	910	2.5
Wind	4	4.2	690	1.9
Herbicide drift injury	1	1.1	230	0.6
Excessive rain	1	1.1	195	0.5
Water damage (beans not harvested)	11	11.6	174	0.5
Frost	2	2.1	110	0.3
Soil salinity	3	3.2	75	0.2
Micronutrient deficiency	1	1.1	20	0.1
North Dakota				
Drought	64	43.8	38,413	44.1
Harvest	21	14.4	10,125	11.6
Hail	39	26.7	9,100	10.5
No problems reported	24	16.4	9,022	10.4
Emergence	20	13.7	6,055	7
Diseases	17	11.6	5,854	6.7
Weeds	44	30.1	4,678	5.4
Wind	12	8.2	4,138	4.8
Applied herbicide injury	6	4.1	4,004	4.6
Soil salinity	53	36.3	3,535	4.1
Delayed planting	6	4.1	1,654	1.9
Water damage (beans harvested)	18	12.3	1,146	1.3
Water damage (beans not harvested)	19	13	1,045	1.2
Herbicide drift injury	5	3.4	495	0.6
Frost	3	2.1	250	0.3
Insects	1	0.7	136	0.2
Snow	1	0.7	96	0.1
Northharvest				
Drought	79	32.8	43,936	35.7
No problems reported	42	17.4	14,371	11.7
Diseases	45	18.7	13,777	11.2
Harvest	34	14.1	13,291	10.8
Hail	53	22	12,019	9.8
Weeds	69	28.6	9,756	7.9
Water damage (beans harvested)	54	22.4	8,734	7.1
Emergence	29	12	8,284	6.7
Applied herbicide injury	11	4.6	4,914	4
Wind	16	6.6	4,828	3.9
Soil salinity	56	23.2	3,610	2.9
Delayed planting	8	3.3	2,779	2.3
Insects	7	2.9	2,259	1.8
Water damage (beans not harvested)	30	12.4	1,219	1
Herbicide drift injury	6	2.5	725	0.6
Frost	5	2.1	360	0.3
Excessive rain	1	0.4	195	0.2
Snow	1	0.4	96	0.1
Micronutrient deficiency	1	0.4	20	0

^aRespondents' acres only.

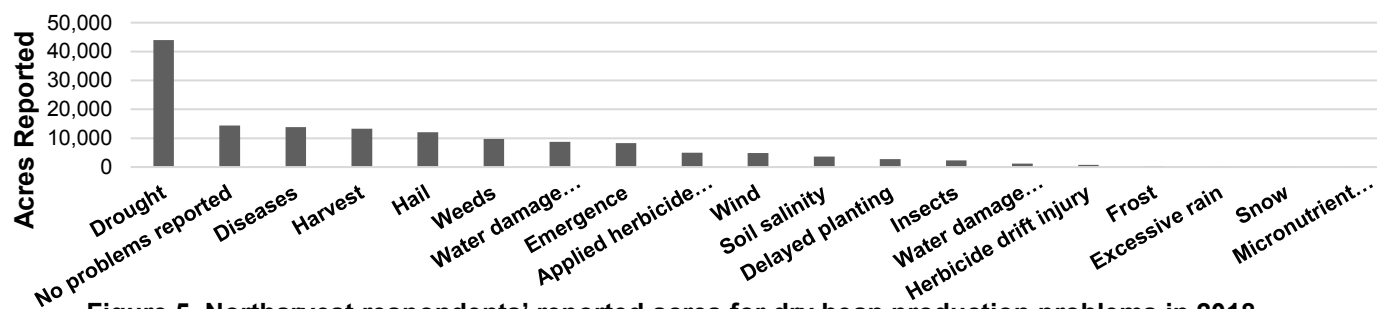


Figure 5. Northharvest respondents' reported acres for dry bean production problems in 2018.

Table 7. Dicamba drift injury on dry bean acreage reported in 2018.

Dicamba injury	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
Yes	3	3.2	904	2.5
No	92	96.8	35,170	97.5
Total	95	100	36,074	100
North Dakota				
Yes	3	2.1	810	0.9
No	143	97.9	86,264	99.1
Total	146	100	87,074	100
Northarvest				
Yes	6	2.5	1,714	1.4
No	235	97.5	121,434	98.6
Total	241	100	123,148	100

^aRespondents' acres only.

Table 8. Reported yield loss due to dicamba drift injury on dry beans in 2018.

Dicamba injury	Respondents (no.)	Minimum reported loss (lbs/acre)	Maximum reported loss (lbs/acre)
Minnesota	3	0	2,000
North Dakota	3	0	300

Table 9. Purchased seed size problems that affected acreage planting intentions in 2018.

Variety	Class	Respondents (no.)	Acres reported ^a	Not enough seed			Too much seed		
				Respondents (no.)	Acres affected ^a	%	Respondents (no.)	Acres affected ^a	%
Minnesota									
Black Cat	Black	3	341	1	10	2.9	0	0	0
Eclipse	Black	23	5,177	1	5	0.1	0	0	0
Montcalm	Kidney	14	4,075	2	110	2.7	1	10	0.2
Pink Panther	Kidney	7	809	2	90	11.1	0	0	0
HMS									
Medalist	Navy	30	6,347	1	5	0.1	1	5	0.1
North Dakota									
Black Cat	Black	3	525	0	0	0	0	0	0
Eclipse	Black	27	8,484	1	15	0.2	0	0	0
Montcalm	Kidney	2	198	0	0	0	0	0	0
HMS									
Medalist	Navy	23	7,174	0	0	0	1	20	0.3
Vibrant	Pinto	36	16,622	3	57	0.3	1	100	0.6
Northarvest									
Black Cat	Black	6	866	1	10	1.2	0	0	0
Eclipse	Black	50	13,661	2	20	0.1	0	0	0
Montcalm	Kidney	16	4,273	2	110	2.6	1	10	0.2
Pink Panther	Kidney	7	809	2	90	11.1	0	0	0
HMS									
Medalist	Navy	53	13,521	1	5	0	2	25	0.2
Vibrant	Pinto	36	16,622	3	57	0.3	1	100	0.6

^aRespondents' acres only.

Table 10. Row spacing by dry bean market class in 2018.

Row spacing	Black ^a		Cranberry		Kidney		Navy ^a		Pink		Pinto ^a		Red	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Minnesota														
< 11 inches	1	2.8	0	0	0	0	0	0	0	0	0	0	0	0
11 to 15 inches	4	11.1	0	0	0	0	4	9.8	0	0	0	0	0	0
16 to 20 inches	2	5.6	0	0	0	0	2	4.9	0	0	0	0	0	0
21 to 25 inches	20	55.6	0	0	10	41.7	25	61	0	0	1	50	1	100
26 to 30 inches	9	25	0	0	14	58.3	10	24.4	0	0	1	50	0	0
> 30 inches	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	36	100	0	0	24	100	41	100	0	0	2	100	1	100
North Dakota														
< 11 inches	0	0	0	0	0	0	0	0	0	0	2	1.9	0	0
11 to 15 inches	4	11.1	0	0	0	0	1	3.7	0	0	8	7.5	0	0
16 to 20 inches	3	8.3	0	0	0	0	2	7.4	0	0	9	8.5	0	0
21 to 25 inches	18	50	1	100	1	33.3	16	59.3	3	75	40	37.7	1	14.3
26 to 30 inches	11	30.6	0	0	2	66.7	8	29.6	1	25	46	43.4	6	85.7
> 30 inches	0	0	0	0	0	0	0	0	0	0	1	0.9	0	0
Total	36	100	1	100	3	100	27	100	4	100	106	100	7	100
Northharvest														
< 11 inches	1	1.4	0	0	0	0	0	0	0	0	2	1.9	0	0
11 to 15 inches	8	11.1	0	0	0	0	5	7.4	0	0	8	7.4	0	0
16 to 20 inches	5	6.9	0	0	0	0	4	5.9	0	0	9	8.3	0	0
21 to 25 inches	38	52.8	1	100	11	40.7	41	60.3	3	75	41	38	2	25
26 to 30 inches	20	27.8	0	0	16	59.3	18	26.5	1	25	47	43.5	6	75
> 30 inches	0	0	0	0	0	0	0	0	0	0	1	0.9	0	0
Total	72	100	1	100	27	100	68	100	4	100	108	100	8	100

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

Table 11. Seeding rate by dry bean market class in 2018.

Seeding rate ^a	Black ^b		Cranberry		Kidney		Navy ^b		Pink		Pinto ^b		Red	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Minnesota														
<60,000	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
70 to 79,000	0	0	0	0	8	30.8	0	0	0	0	0	0	0	0
80 to 89,000	3	8.3	0	0	10	38.5	2	5.1	0	0	2	100	1	100
90 to 99,000	4	11.1	0	0	8	30.8	2	5.1	0	0	0	0	0	0
100 to 109,000	7	19.4	0	0	0	0	4	10.3	0	0	0	0	0	0
110 to 119,000	9	25	0	0	0	0	18	46.2	0	0	0	0	0	0
120 to 129,000	11	30.6	0	0	0	0	9	23.1	0	0	0	0	0	0
> 129,000	2	5.6	0	0	0	0	4	10.3	0	0	0	0	0	0
Total	36	100	0	0	26	100	39	100	0	0	2	100	1	100
North Dakota														
<60,000	0	0	0	0	0	0	0	0	0	0	1	1	0	0
60 to 69,000	0	0	0	0	0	0	0	0	0	0	6	6.1	0	0
70 to 79,000	0	0	0	0	0	0	1	4	4	100	48	48.5	1	14.3
80 to 89,000	3	8.3	1	100	3	100	1	4	0	0	33	33.3	2	28.6
90 to 99,000	6	16.7	0	0	0	0	4	16	0	0	7	7.1	4	57.1
100 to 109,000	13	36.1	0	0	0	0	8	32	0	0	4	4	0	0
110 to 119,000	11	30.6	0	0	0	0	9	36	0	0	0	0	0	0
120 to 129,000	1	2.8	0	0	0	0	2	8	0	0	0	0	0	0
> 129,000	2	5.6	0	0	0	0	0	0	0	0	0	0	0	0
Total	36	100	1	100	3	100	25	100	4	100	99	100	7	100
Northharvest														
<60,000	0	0	0	0	0	0	0	0	0	0	1	1	0	0
60 to 69,000	0	0	0	0	0	0	0	0	0	0	6	5.9	0	0
70 to 79,000	0	0	0	0	8	27.6	1	1.6	4	100	48	47.5	1	12.5
80 to 89,000	6	8.3	1	100	13	44.8	3	4.7	0	0	35	34.7	3	37.5
90 to 99,000	10	13.9	0	0	8	27.6	6	9.4	0	0	7	6.9	4	50
100 to 109,000	20	27.8	0	0	0	0	12	18.8	0	0	4	4	0	0
110 to 119,000	20	27.8	0	0	0	0	27	42.2	0	0	0	0	0	0
120 to 129,000	12	16.7	0	0	0	0	11	17.2	0	0	0	0	0	0
> 129,000	4	5.6	0	0	0	0	4	6.3	0	0	0	0	0	0
Total	72	100	1	100	29	100	64	100	4	100	101	100	8	100

^aLive seeds per acre.

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

Table 12. Percent of total dry bean acres harvested by direct combining in 2018.

Percent direct combined	Respondents (no.)	Respondents (%)	Acres reported ^a	Acres reported ^a (%)
Minnesota				
1 to 25%	5	5.6	5,705	16.3
26 to 50%	6	6.7	4,037	11.6
51 to 75%	1	1.1	1,200	3.4
76 to 99%	2	2.2	560	1.6
100%	53	58.9	12,475	35.7
No direct harvest	23	25.6	10,964	31.4
Total	90	100	34,941	100
North Dakota				
1 to 25%	5	3.6	5,715	6.9
26 to 50%	6	4.3	5,835	7
51 to 75%	5	3.6	2,358	2.8
76 to 99%	13	9.4	8,061	9.7
100%	85	61.6	45,941	55.5
No direct harvest	24	17.4	14,918	18
Total	138	100	82,828	100
Northharvest				
1 to 25%	10	4.4	11,420	9.7
26 to 50%	12	5.3	9,872	8.4
51 to 75%	6	2.6	3,558	3
76 to 99%	15	6.6	8,621	7.3
100%	138	60.5	58,416	49.6
No direct harvest	47	20.6	25,882	22
Total	228	100	117,769	100

^aRespondents' harvested acres only.

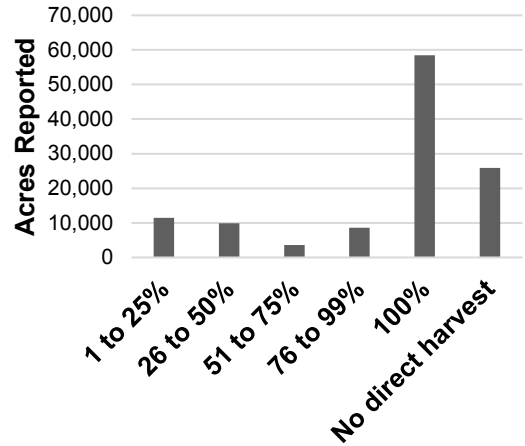


Figure 6. Northharvest percent of dry bean acres harvested by direct combining in 2018.

Table 13. Estimated yield loss in harvested dry beans in 2018.

Estimated yield loss	Direct Harvest		Conventional Harvest	
	Respondents (no.)	Respondents (%)	Respondents (no.)	Respondents (%)
Minnesota				
1 to 5%	37	55.2	30	81.1
6 to 10%	25	37.3	7	18.9
11 to 15%	4	6	0	0
16 to 20%	1	1.5	0	0
Total	67	100	37	100
North Dakota				
0%	1	0.9	0	0
1 to 5%	62	54.4	42	82.4
6 to 10%	34	29.8	9	17.6
11 to 15%	13	11.4	0	0
16 to 20%	4	3.5	0	0
Total	114	100	51	100
Northharvest				
0%	1	0.6	0	0
1 to 5%	99	54.7	72	81.8
6 to 10%	59	32.6	16	18.2
11 to 15%	17	9.4	0	0
16 to 20%	5	2.8	0	0
Total	181	100	88	100

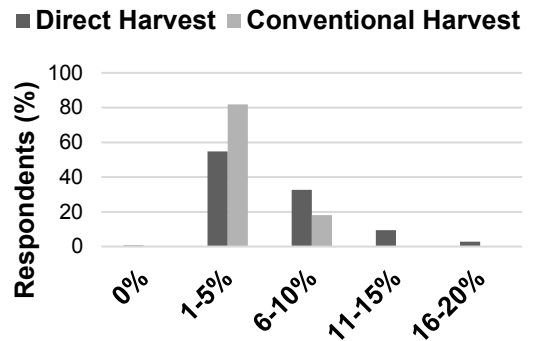


Figure 7. Northharvest estimated yield loss in harvested dry beans in 2018.

Table 14. Dry bean field tillage practices in 2018.

Tillage practice	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota		
Conventional	30,278	84.3
Minimum	5,183	14.4
No-till	450	1.3
Strip-tillage	0	0
Total	35,911	100
North Dakota		
Conventional	62,651	73.3
Minimum	11,492	13.4
No-till	6,041	7.1
Strip-tillage	5,300	6.2
Total	85,484	100
Northharvest		
Conventional	92,929	76.6
Minimum	16,675	13.7
No-till	6,491	5.3
Strip-tillage	5,300	4.4
Total	121,395	100

^aRespondents' acres only.

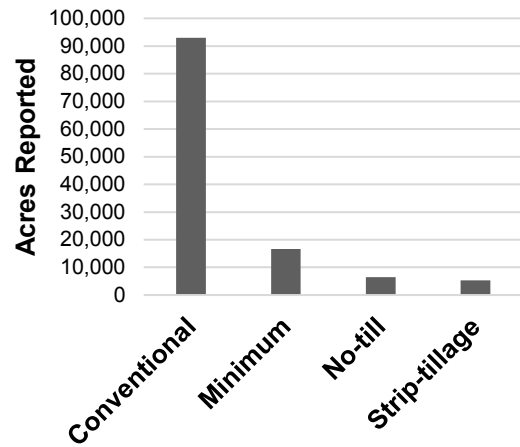


Figure 8. Northharvest dry bean field tillage practices in 2018.

Agronomy

Table 15. Cover crop use on dry bean fields in 2018.

Cover crop use	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
Yes	30	31.6	13,200	36.6
No	65	68.4	22,874	63.4
Total	95	100	36,074	100
North Dakota				
Yes	17	11.7	10,389	12
No	128	88.3	76,035	88
Total	145	100	86,424	100
Northharvest				
Yes	47	19.6	23,589	19.3
No	193	80.4	98,909	80.7
Total	240	100	122,498	100

^aRespondents' acres only.

Table 16. Reasons for cover crop use on dry bean fields in 2018.

Cover crop practice	Respondents (no.)	Respondents (%) ^a
Minnesota		
Soil conservation	28	93.3
Weed control	4	13.3
Moisture conservation	0	0
Biodiversity	1	3.3
No reason given	1	3.3
North Dakota		
Soil conservation	17	100
Weed control	1	5.9
Moisture conservation	2	11.8
Biodiversity	0	0
No reason given	0	0
Northharvest		
Soil conservation	45	95.7
Weed control	5	10.6
Moisture conservation	2	4.3
Biodiversity	1	2.1
No reason given	1	2.1

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

Table 17. Seasonal use of cover crops on dry bean fields in 2018.

Cover crop practice	Respondents (no.)	Respondents (%) ^a
Minnesota		
Before planting dry beans	2	6.7
After planting dry beans	26	86.7
Before AND after planting dry beans	2	6.7
Not specified	0	0
Total	30	100
North Dakota		
Before planting dry beans	2	11.8
After planting dry beans	14	82.4
Before AND after planting dry beans	0	0
Not specified	1	5.9
Total	17	100
Northharvest		
Before planting dry beans	4	8.5
After planting dry beans	40	85.1
Before AND after planting dry beans	2	4.3
Not specified	1	2.1
Total	47	100

Table 18. Cover crop species composition on dry bean fields in 2018.

Cover crop practice	Respondents (no.)	Respondents (%) ^a
Minnesota		
Cereal grass species only (barley, oats, rye)	23	76.7
Broadleaf species only (clover, pea, radish, turnip)	0	0
Cereal grass + broadleaf species	7	23.3
Total	30	100
North Dakota		
Cereal grass species only (barley, oats, rye)	11	64.7
Broadleaf species only (clover, pea, radish, turnip)	1	5.9
Cereal grass + broadleaf species	5	29.4
Total	17	100
Northharvest		
Cereal grass species only (barley, oats, rye)	34	72.3
Broadleaf species only (clover, pea, radish, turnip)	1	2.1
Cereal grass + broadleaf species	12	25.5
Total	47	100

Table 19. Ground rolling on dry bean fields in 2018.

Timing	Respondents (no.)	Respondents (%) ^a	Acres reported (no.) ^b	Acres reported (%) ^b
Minnesota				
Pre-plant	15	16.7	4,539	12.9
Pre-emerge	46	51.1	11,923	33.9
Post-emerge	3	3.3	345	1
Did not roll	38	42.2	18,365	52.2
Total			35,172	100
North Dakota				
Pre-plant	12	8.6	4,566	5.6
Pre-emerge	88	62.9	47,784	58.8
Post-emerge	6	4.3	1,910	2.3
Did not roll	51	36.4	27,039	33.3
Total			81,299	100
Northharvest				
Pre-plant	27	11.7	9,105	7.8
Pre-emerge	134	58.3	59,707	51.3
Post-emerge	9	3.9	2,255	1.9
Did not roll	89	38.7	45,404	39
Total			116,471	100

^aPercentages do not total 100 percent because some respondents practiced more than one timing. ^bRespondents' acres only.

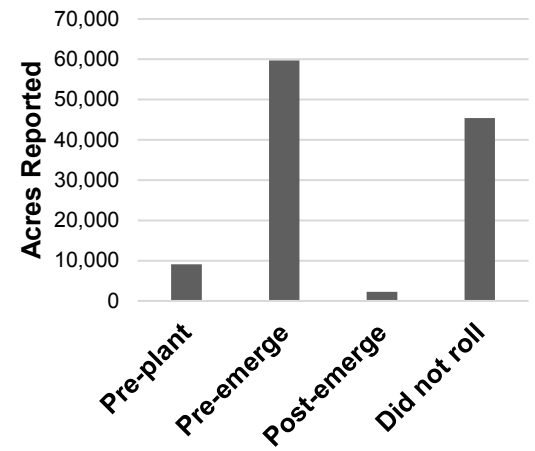


Figure 9. Northharvest ground rolling on dry bean fields in 2018.

Table 20. Ground rolling and direct harvest on dry bean fields in 2018.

Percent Direct Combined	Ground Rolling			
	Yes		No	
Minnesota	Respondents (no.)	Respondents (%)	Respondents (no.)	Respondents (%)
0%	0	0	19	54.3
1 to 25%	4	6.5	4	11.4
26 to 50%	6	9.7	3	8.6
51 to 75%	1	1.6	1	2.9
76 to 99%	0	0	2	5.7
100%	51	82.3	6	17.1
Total	62	100	35	100
North Dakota				
0%	2	2	19	38.8
1 to 25%	1	1	5	10.2
26 to 50%	4	4	2	4.1
51 to 75%	5	5.1	3	6.1
76 to 99%	9	9.1	6	12.2
100%	78	78.8	14	28.6
Total	99	100	49	100
Northharvest				
0%	2	1.2	38	45.2
1 to 25%	5	3.1	9	10.7
26 to 50%	10	6.2	5	6
51 to 75%	6	3.7	4	4.8
76 to 99%	9	5.6	8	9.5
100%	129	80.1	20	23.8
Total	161	100	84	100

Table 21. Use of fertilizers on dry bean fields in 2018.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Nitrogen	79	95.2
Phosphorus	68	81.9
Potash	62	74.7
Zinc	56	67.5
Sulfur	48	57.8
North Dakota		
Nitrogen	111	88.1
Phosphorus	101	80.2
Potash	44	34.9
Zinc	71	56.3
Sulfur	36	28.6
Northharvest		
Nitrogen	190	90.9
Phosphorus	169	80.9
Potash	106	50.7
Zinc	127	60.8
Sulfur	84	40.2

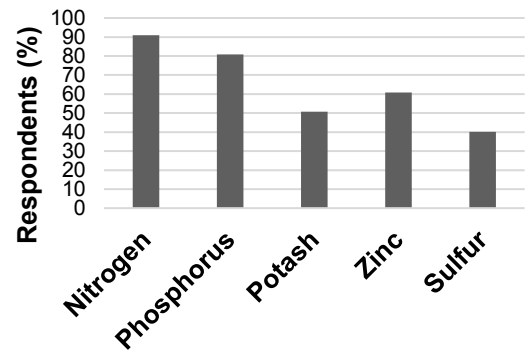


Figure 10. Northharvest use of fertilizers on dry bean fields in 2018.

Table 22. Fertilizer application methods on dry bean fields in 2018.

Fertilizer	Respondents (no.)	Respondents (%)
Minnesota		
Broadcast	86	95.6
In-furrow	29	32.2
Banded	9	10
Foliar	10	11.1
North Dakota		
Broadcast	113	85
In-furrow	48	36.1
Banded	23	17.3
Foliar	9	6.8
Northharvest		
Broadcast	199	89.2
In-furrow	77	34.5
Banded	32	14.3
Foliar	19	8.5

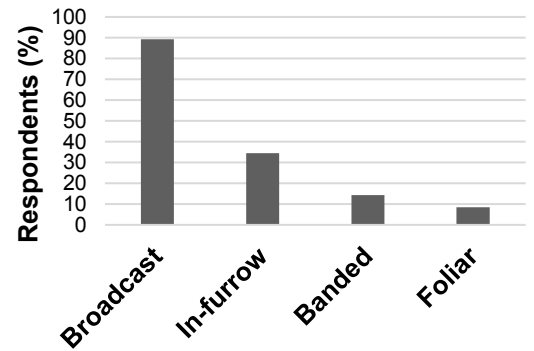


Figure 11. Northharvest fertilizer application methods on dry bean fields in 2018.

Table 23. Use of soil test prior to fertilization of dry bean fields in 2018.

Soil test	Respondents (no.)	Respondents (%)
Minnesota		
Soil test used	70	76.1
Soil test not used	22	23.9
Total	92	100
North Dakota		
Soil test used	110	78
Soil test not used	31	22
Total	141	100
Northharvest		
Soil test used	180	77.3
Soil test not used	53	22.7
Total	233	100

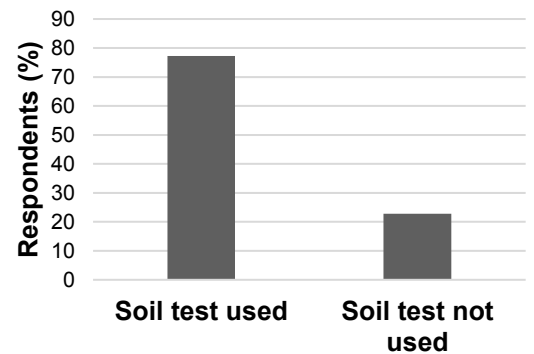


Figure 12. Northharvest use of soil test in 2018.

Table 24. Use of *Rhizobium* inoculants on dry bean fields in 2018.

<i>Rhizobium</i> use	Respondents (no.)	Respondents (%)
Minnesota		
Inoculant used	13	14.8
Inoculant not used	75	85.2
Total	88	100
North Dakota		
Inoculant used	28	20.7
Inoculant not used	107	79.3
Total	135	100
Northharvest		
Inoculant used	41	18.4
Inoculant not used	182	81.6
Total	223	100

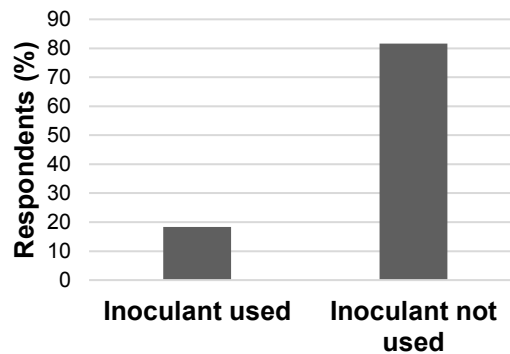


Figure 13. Northharvest use of inoculant in 2018.

Table 25. Use of site-specific nutrient management (SSNM) on dry bean fields in 2018.

Soil test	Respondents (no.)	Respondents (%)
Minnesota		
SSNM used	24	27.3
SSNM not used	64	72.7
Total	88	100
North Dakota		
SSNM used	35	25.5
SSNM not used	102	74.5
Total	137	100
Northharvest		
SSNM used	59	26.2
SSNM not used	166	73.8
Total	225	100

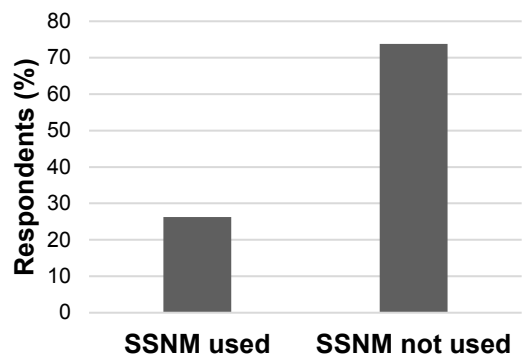


Figure 14. Northharvest use of site-specific nutrient management in 2018.

Table 26. Desiccants used on dry beans in 2018.

Desiccant	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^a	Acres reported (%) ^a
Minnesota				
Sharpen	57	61.3	20,306	56.9
None used	18	19.4	6,538	18.3
Valor	16	17.2	6,449	18.1
Paraquat	13	14	4,760	13.3
Glyphosate	8	8.6	2,383	6.7
Sodium chlorate	1	1.1	40	0.1
Desiccant Total			33,938	
North Dakota				
Sharpen	79	56.4	38,823	45.7
Glyphosate	46	32.9	29,268	34.5
None used	32	22.9	16,564	19.5
Valor	22	15.7	15,944	18.8
Paraquat	26	18.6	13,131	15.5
Sodium chlorate	5	3.6	3,218	3.8
Desiccant Total			100,384	
Northharvest				
Sharpen	136	58.4	59,129	49
Glyphosate	54	23.2	31,651	26.2
None used	50	21.5	23,102	19.2
Valor	38	16.3	22,393	18.6
Paraquat	39	16.7	17,891	14.8
Sodium chlorate	6	2.6	3,258	2.7
Desiccant Total			134,322	

^aRespondents' acres only.

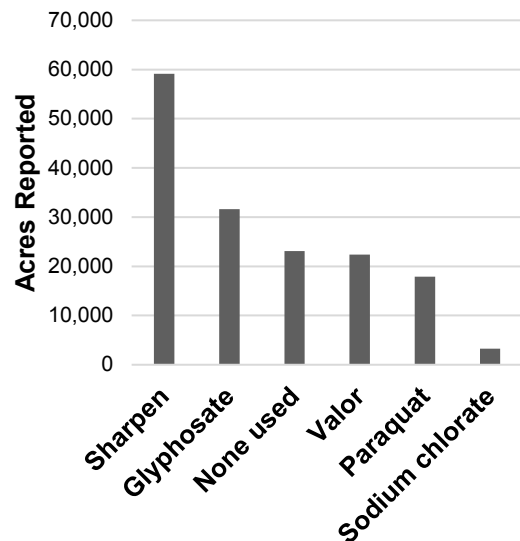


Figure 15. Northharvest desiccants used on dry beans in 2018.

Table 27. Desiccant tank-mixes used on dry beans in 2018.

Desiccant Combination	Respondents (no.)	Acres reported (no.)
Minnesota		
Paraquat + Sharpen	10	3,895
Glyphosate + Valor	1	920
Glyphosate + Sharpen	3	568
Paraquat + Valor	2	460
Sharpen + Valor	2	330
North Dakota		
Glyphosate + Sharpen	28	14,124
Glyphosate + Valor	5	5,679
Glyphosate + Paraquat + Valor	1	3,300
Paraquat + Sharpen	7	3,040
Sharpen + Valor	5	2,390
Paraquat + Valor	2	2,000
Sharpen + Sodium Chlorate	2	1,625
Glyphosate + Sodium Chlorate	1	1,000
Paraquat + Sodium Chlorate	1	553
Glyphosate + Paraquat	1	400
Northharvest		
Glyphosate + Sharpen	31	14,692
Paraquat + Sharpen	17	6,935
Glyphosate + Valor	6	6,599
Glyphosate + Paraquat + Valor	1	3,300
Sharpen + Valor	7	2,720
Paraquat + Valor	4	2,460
Sharpen + Sodium Chlorate	2	1,625
Glyphosate + Sodium Chlorate	1	1,000
Paraquat + Sodium Chlorate	1	553
Glyphosate + Paraquat	1	400

Table 28. Frequency of previous crops (2014 - 2017) in fields planted to dry bean in 2018.

Year	2017	2016	2015	2014	4-year average
Crop	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)	Respondents (%)
Minnesota					
Alfalfa	1.1	1.1	1.2	1.2	1.1
Barley	0	2.2	1.2	0	0.9
Corn	68.9	33.3	55.8	40	49.6
Dry bean	2.2	14.4	24.4	27.1	16.8
Field pea	0	2.2	1.2	0	0.9
Hay/Grass	2.2	0	1.2	0	0.9
No crop	0	1.1	1.2	2.4	1.1
Oats	0	1.1	0	0	0.3
Potato	3.3	4.4	2.3	4.7	3.7
Soybean	1.1	42.2	19.8	21.2	21.1
Sugar beet	20	7.8	2.3	10.6	10.3
Sunflower	0	1.1	0	0	0.3
Wheat	18.9	12.2	9.3	7.1	12
North Dakota					
Barley	7.8	2.2	4.6	3.9	4.6
Canola	0	3.6	0	0.8	1.1
Corn	40.4	10.1	35.9	16.4	25.8
Dry bean	0.7	32.6	17.6	49.2	24.5
Field pea	0	3.6	0	0.8	1.1
Hay/Grass	0.7	0	1.5	0	0.6
Potato	2.1	4.3	1.5	3.1	2.8
Soybean	1.4	35.5	12.2	18.8	16.9
Sugar beet	18.4	8.7	4.6	8.6	10.2
Sunflower	0	4.3	0.8	0.8	1.5
Wheat	61	26.1	51.9	25	41.3
Northarvest					
Alfalfa	0.4	0.4	0.5	0.5	0.4
Barley	4.8	2.2	3.2	2.3	3.1
Canola	0	2.2	0	0.5	0.7
Corn	51.5	19.3	43.8	25.8	35.2
Dry bean	1.3	25.4	20.3	40.4	21.5
Field pea	0	3.1	0.5	0.5	1
Hay/Grass	1.3	0	1.4	0	0.7
No crop	0	0.4	0.5	0.9	0.4
Oats	0	0.4	0	0	0.1
Potato	2.6	4.4	1.8	3.8	3.1
Soybean	1.3	38.2	15.2	19.7	18.6
Sugar beet	19	8.3	3.7	9.4	10.2
Sunflower	0	3.1	0.5	0.5	1
Wheat	44.6	20.6	35	17.8	29.7

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

Number of years	Respondents (no.)	Respondents (%)
Minnesota		
1 of past 5 years	43	47.8
2 of past 5 years	37	41.1
3 of past 5 years	9	10
4 of past 5 years	0	0
5 of past 5 years	1	1.1
Total	90	100
North Dakota		
1 of past 5 years	54	38.3
2 of past 5 years	49	34.8
3 of past 5 years	34	24.1
4 of past 5 years	3	2.1
5 of past 5 years	1	0.7
Total	141	100
Northarvest		
1 of past 5 years	97	42
2 of past 5 years	86	37.2
3 of past 5 years	43	18.6
4 of past 5 years	3	1.3
5 of past 5 years	2	0.9
Total	231	100

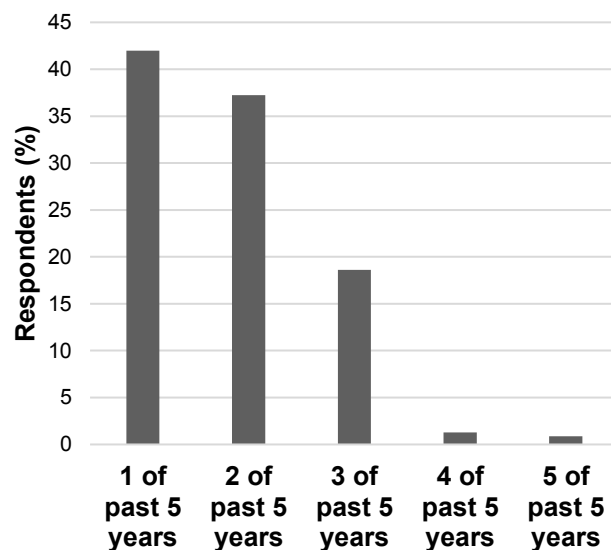


Figure 16. Northarvest number of years dry beans are grown in dry bean crop rotation program.

Insect Pests and Insecticide Use

Table 30. Worst insect problem in dry beans in 2018.

Insect ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
None	43	50	15,714	47.4
Leafhoppers	34	39.5	12,533	37.8
Cutworms	1	1.2	2,900	8.8
Bean leaf beetle	2	2.3	585	1.8
Grasshoppers	2	2.3	535	1.6
Seed corn maggot	1	1.2	435	1.3
Foliage caterpillars	1	1.2	210	0.6
Aphids	1	1.2	106	0.3
Spider mites	1	1.2	100	0.3
Total	86	100	33,118	100
North Dakota				
None	83	68.6	52,464	70.8
Grasshoppers	21	17.4	9,696	13.1
Cutworms	4	3.3	3,190	4.3
Wireworms	2	1.7	2,930	4
Aphids	5	4.1	1,765	2.4
Spider mites	2	1.7	1,480	2
Seed corn maggot	1	0.8	1,399	1.9
Leafhoppers	1	0.8	606	0.8
Armyworms	1	0.8	410	0.6
Bean leaf beetle	1	0.8	160	0.2
Total	121	100	74,100	100
Northarvest				
None	126	60.9	68,178	63.6
Leafhoppers	35	16.9	13,139	12.3
Grasshoppers	23	11.1	10,231	9.5
Cutworms	5	2.4	6,090	5.7
Wireworms	2	1	2,930	2.7
Aphids	6	2.9	1,871	1.7
Seed corn maggot	2	1	1,834	1.7
Spider mites	3	1.4	1,580	1.5
Bean leaf beetle	3	1.4	745	0.7
Armyworms	1	0.5	410	0.4
Foliage caterpillars	1	0.5	210	0.2
Total	207	100	107,218	100

^aRanked as No. 1 insect problem by respondents.

^bRespondents' acres only.

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

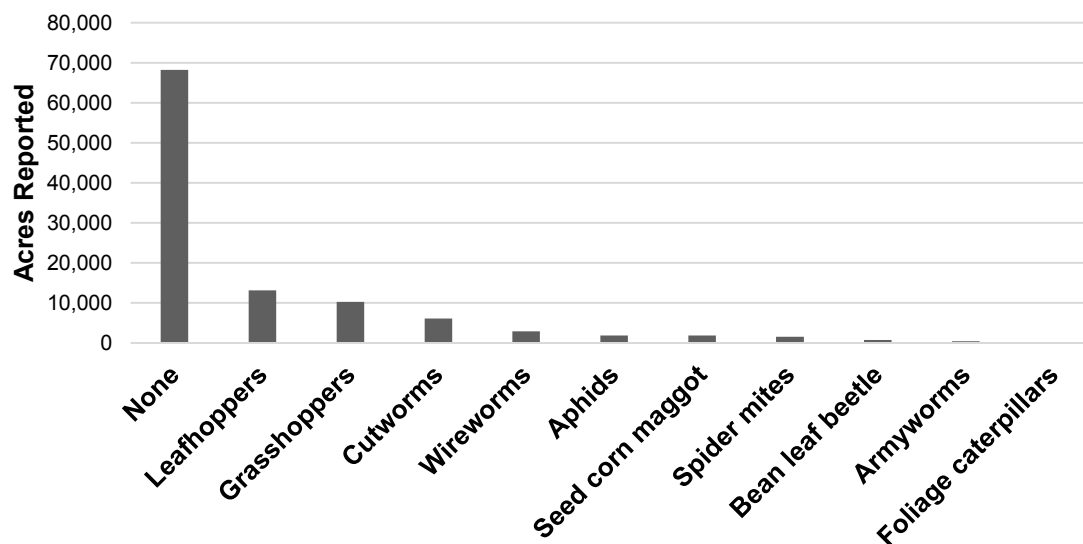


Figure 17. Northarvest worst insect problem in dry beans in 2018.

Table 31. Insects ranked as one of the three worst in dry beans in 2018.

Insect ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
Leafhoppers	38	44.2	15,903	48
None	43	50	15,714	47.4
Cutworms	5	5.8	3,433	10.4
Grasshoppers	11	12.8	3,211	9.7
Bean leaf beetle	9	10.5	2,885	8.7
Seed corn maggot	5	5.8	2,605	7.9
Wireworms	2	2.3	790	2.4
Aphids	5	5.8	597	1.8
Spider mites	3	3.5	400	1.2
Foliage caterpillars	2	2.3	325	1
Armyworms	1	1.2	60	0.2
North Dakota				
None	83	68.6	52,464	70.8
Grasshoppers	27	22.3	15,352	20.7
Cutworms	9	7.4	6,411	8.7
Wireworms	7	5.8	6,350	8.6
Aphids	8	6.6	2,635	3.6
Spider mites	7	5.8	2,276	3.1
Leafhoppers	5	4.1	1,801	2.4
Seed corn maggot	1	0.8	1,399	1.9
Bean leaf beetle	5	4.1	1,221	1.6
Armyworms	2	1.7	1,010	1.4
Foliage caterpillars	2	1.7	376	0.5
Northarvest				
None	126	60.9	68,178	63.6
Grasshoppers	38	18.4	18,563	17.3
Leafhoppers	43	20.8	17,704	16.5
Cutworms	14	6.8	9,844	9.2
Wireworms	9	4.3	7,140	6.7
Bean leaf beetle	14	6.8	4,106	3.8
Seed corn maggot	6	2.9	4,004	3.7
Aphids	13	6.3	3,232	3
Spider mites	10	4.8	2,676	2.5
Armyworms	3	1.4	1,070	1
Foliage caterpillars	4	1.9	701	0.7

^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.

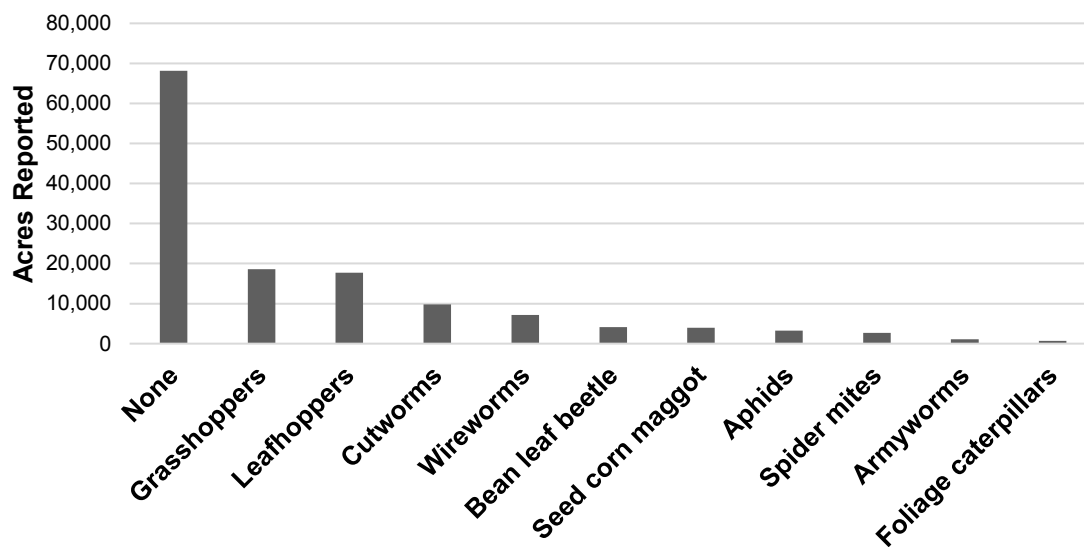


Figure 18. Northarvest insects ranked as one of the three worst in dry beans in 2018.

Table 32. Foliar insecticide use in dry beans in 2018.

Insecticide	Respondents (no.)	Respondents (%)	Acres reported (no.)^{a,b}	Acres reported (%)^{a,b}
Minnesota				
None	57	64	22,691	65.9
Warrior	12	13.5	5,359	15.6
Asana XL	14	15.7	5,073	14.7
Hero	1	1.1	2,185	6.3
Tombstone	1	1.1	800	2.3
Brigade	1	1.1	230	0.7
Mustang Maxx	1	1.1	160	0.5
Pyganic	1	1.1	150	0.4
Baythroid XL	1	1.1	115	0.3
Lorsban	1	1.1	73	0.2
Insecticide Total			14,145	
North Dakota				
None	135		81,880	
None	129	95.6	79,579	97.2
Warrior	4	3	1,506	1.8
Acephate	1	0.7	600	0.7
Mustang Maxx	1	0.7	35	0
Insecticide Total			2,141	
Northarvest				
None	224		116,296	
None	186	83	102,270	87.9
Warrior	16	7.1	6,865	5.9
Asana XL	14	6.3	5,073	4.4
Hero	1	0.4	2,185	1.9
Tombstone	1	0.4	800	0.7
Acephate	1	0.4	600	0.5
Brigade	1	0.4	230	0.2
Mustang Maxx	2	0.9	195	0.2
Pyganic	1	0.4	150	0.1
Baythroid XL	1	0.4	115	0.1
Lorsban	1	0.4	73	0.1
Insecticide Total			16,286	

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

^bPercentages do not total 100 percent because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.

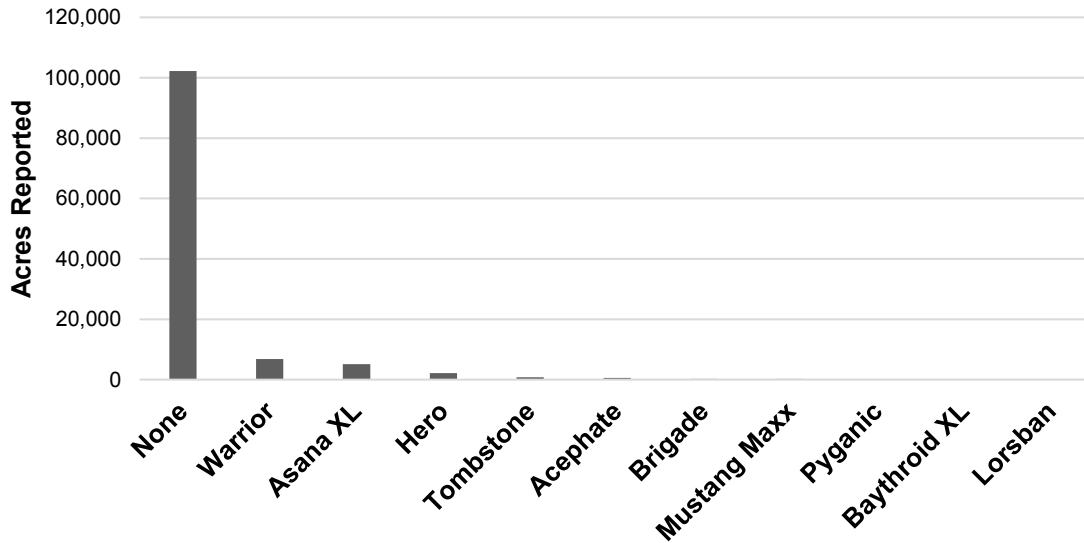


Figure 19. Northarvest foliar insecticide use in dry beans in 2018.

Table 33. Soil insecticide and seed treatment use in dry beans in 2018.

Seed Treatment	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{a,b}	Acres reported (%) ^{a,b}
Minnesota				
Cruiser Maxx	31	34.4	16,162	46.9
Lorsban	10	11.1	6,440	18.7
None	26	28.9	5,913	17.2
Don't know	17	18.9	5,517	16
Dyna-Shield Imidacloprid	4	4.4	4,425	12.8
Cruiser 5FS	3	3.3	2,261	6.6
Cruiser Maxx Vibrance	6	6.7	1,415	4.1
Capture LFR ^c	1	1.1	550	1.6
Gaucho 600FS	1	1.1	260	0.8
Insecticide Total			37,030	
North Dakota				
Cruiser Maxx	49	36.3	29,619	37.4
None	43	31.9	23,563	29.7
Don't know	29	21.5	15,670	19.8
Capture LFR	9	6.7	5,731	7.2
Lorsban	8	5.9	4,349	5.5
Gaucho 600FS	3	2.2	3,470	4.4
Cruiser Maxx Vibrance	5	3.7	3,272	4.1
Cruiser 5FS	1	0.7	600	0.8
Insecticide Total			62,711	
Northharvest				
Cruiser Maxx	80	35.6	45,781	40.3
None	69	30.7	29,476	25.9
Don't know	46	20.4	21,187	18.6
Lorsban	18	8	10,789	9.5
Capture LFR ^c	10	4.4	6,281	5.5
Cruiser Maxx Vibrance	11	4.9	4,687	4.1
Dyna-Shield Imidacloprid	4	1.8	4,425	3.9
Gaucho 600FS	4	1.8	3,730	3.3
Cruiser 5FS	4	1.8	2,861	2.5
Insecticide Total			99,741	

^aRespondents' acres only.

^bPercentages do not total 100 percent 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.

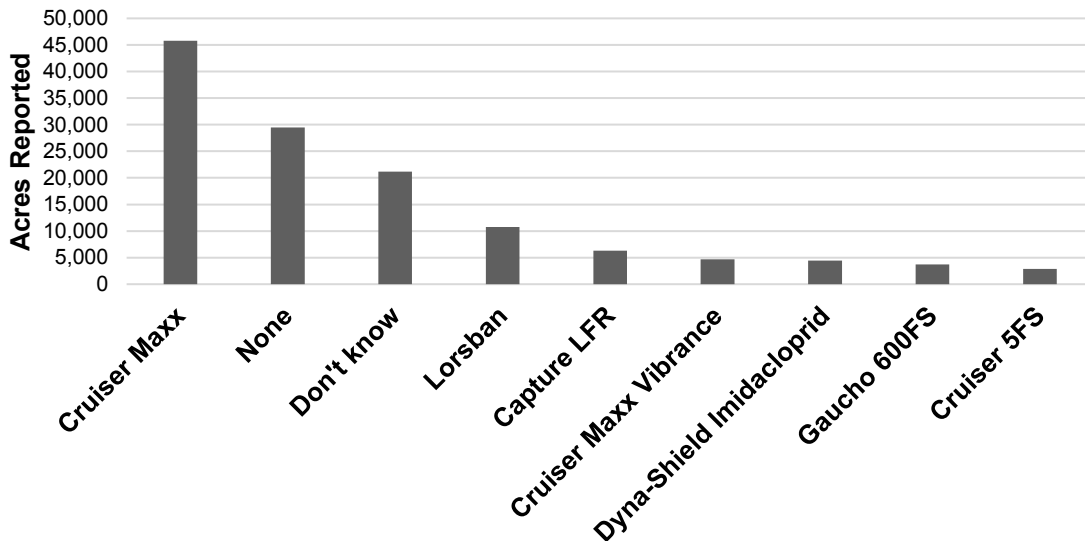


Figure 20. Northharvest insecticide seed treatment and soil insecticide use in dry beans in 2018.

Plant Diseases and Fungicide Use

Table 34. Worst disease problem in dry beans in 2018.

Disease ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
White mold	44	55	19,641	61.2
None	20	25	5,452	17
Common bacterial blight	3	3.8	3,230	10.1
Root rot	12	15	3,177	9.9
Other viruses	1	1.3	600	1.9
Total	80	100	32,100	100
North Dakota				
White mold	49	38.9	29,865	37.8
None	39	31	25,752	32.6
Common bacterial blight	20	15.9	18,388	23.3
Rust	9	7.1	2,053	2.6
Anthraco	2	1.6	1,465	1.9
Bacterial brown spot	2	1.6	540	0.7
Other viruses	1	0.8	290	0.4
Halo blight	1	0.8	250	0.3
Root rot	1	0.8	200	0.3
Bacterial wilt	2	1.6	135	0.2
Total	126	100	78,938	100
Northarvest				
White mold	93	45.1	49,506	44.6
None	59	28.6	31,204	28.1
Common bacterial blight	23	11.2	21,618	19.5
Root rot	13	6.3	3,377	3
Rust	9	4.4	2,053	1.8
Anthraco	2	1	1,465	1.3
Other viruses	2	1	890	0.8
Bacterial brown spot	2	1	540	0.5
Halo blight	1	0.5	250	0.2
Bacterial wilt	2	1	135	0.1
Total	206	100	111,038	100

^aRanked as No. 1 disease problem by respondents.

^bRespondents' acres only.

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

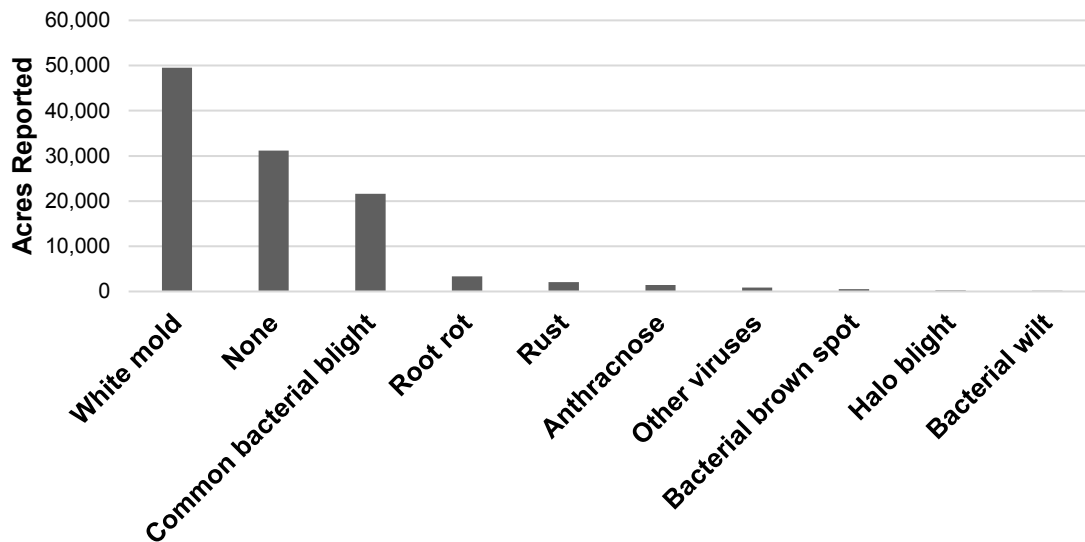


Figure 21. Northarvest worst disease problem in dry beans in 2018.

Table 35. Diseases ranked as one of the three worst in dry beans in 2018.

Disease ^a	Respondents (no.)	Respondents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
White mold	56	70	25,516	79.5
Root rot	31	38.8	18,479	57.6
Common bacterial blight	25	31.3	14,105	43.9
None	20	25	5,452	17
Bacterial brown spot	5	6.3	4,548	14.2
Bacterial wilt	7	8.8	1,931	6
Other viruses	5	6.3	1,865	5.8
Anthracnose	2	2.5	1,300	4
Halo blight	2	2.5	420	1.3
Rust	1	1.3	250	0.8
North Dakota				
White mold	69	54.8	39,231	49.7
Common bacterial blight	40	31.7	28,417	36
None	39	31	25,752	32.6
Rust	19	15.1	12,373	15.7
Bacterial brown spot	14	11.1	7,479	9.5
Root rot	11	8.7	7,427	9.4
Other viruses	8	6.3	6,683	8.5
Halo blight	6	4.8	6,505	8.2
Anthracnose	7	5.6	2,869	3.6
Bacterial wilt	6	4.8	2,119	2.7
Bean common mosaic virus	1	0.8	750	1
Northarvest				
White mold	125	60.7	64,747	58.3
Common bacterial blight	65	31.6	42,522	38.3
None	59	28.6	31,204	28.1
Root rot	42	20.4	25,906	23.3
Rust	20	9.7	12,623	11.4
Bacterial brown spot	19	9.2	12,027	10.8
Other viruses	13	6.3	8,548	7.7
Halo blight	8	3.9	6,925	6.2
Anthracnose	9	4.4	4,169	3.8
Bacterial wilt	13	6.3	4,050	3.6
Bean common mosaic virus	1	0.5	750	0.7

^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.

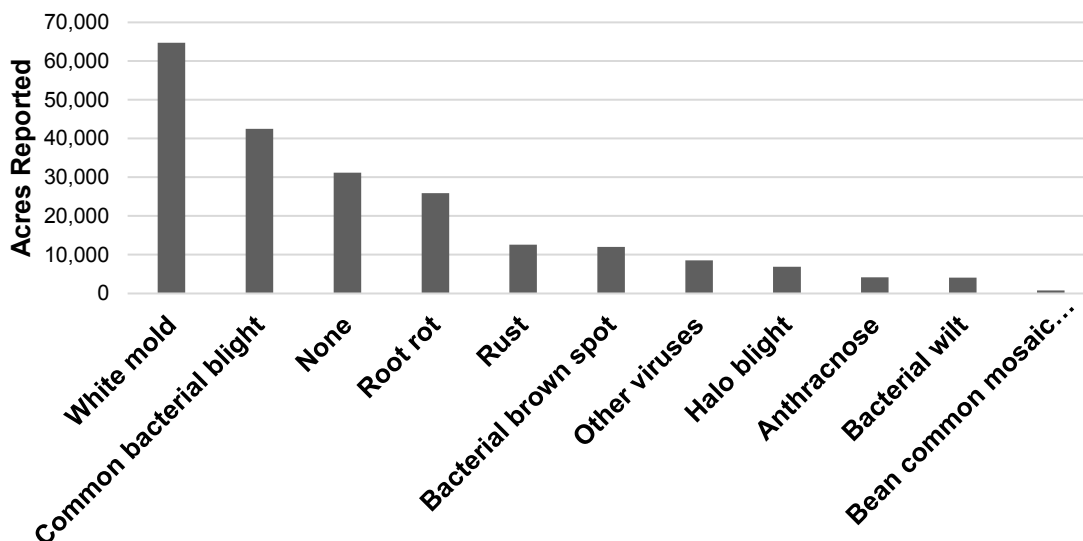


Figure 22. Northarvest diseases ranked as one of the three worst in dry beans in 2018.

Table 36. Foliar fungicide use in dry beans in 2018.

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								
Topsin broadcast	39	41.1	19,151	53.1	16,724	25.5	2,427	3.7
Endura	32	33.7	16,750	46.4	14,960	22.8	1,790	2.7
T-methyl	22	23.2	9,388	26	7,843	12	1,545	2.4
Priaxor	5	5.3	4,745	13.2	4,745	7.2	0	0
Omega	2	2.1	4,530	12.6	4,530	6.9	0	0
ProPulse	4	4.2	3,955	11	3,955	6	0	0
OxiDate	1	1.1	2,460	6.8	2,460	3.8	0	0
Calcium	1	1.1	1,656	4.6	1,656	2.5	0	0
Proline	4	4.2	678	1.9	450	0.7	228	0.3
Kocide	1	1.1	530	1.5	530	0.8	0	0
Headline	1	1.1	470	1.3	470	0.7	0	0
Approach	1	1.1	400	1.1	400	0.6	0	0
Onset	1	1.1	355	1	355	0.5	0	0
Incognito	1	1.1	187	0.5	187	0.3	0	0
Tebuconazole	1	1.1	162	0.4	162	0.2	0	0
Quadris/Amstar	1	1.1	155	0.4	155	0.2	0	0
None	17	17.9	3,786	10.5				
Fungicide Total			65,572		59,582	90.9	5,990	9.1
North Dakota								
T-methyl	33	23.2	29,618	34.5	28,263	31.8	1,355	1.5
Topsin broadcast	28	19.7	19,437	22.6	19,437	21.9	0	0
Endura	34	23.9	17,137	20	16,917	19	220	0.2
Incognito	8	5.6	6,731	7.8	6,731	7.6	0	0
Tebuconazole	5	3.5	6,444	7.5	6,444	7.2	0	0
Priaxor	10	7	4,379	5.1	4,054	4.6	325	0.4
Headline	3	2.1	1,598	1.9	1,598	1.8	0	0
Quadris/Amstar	2	1.4	1,375	1.6	1,000	1.1	375	0.4
Onset	2	1.4	804	0.9	804	0.9	0	0
Vertisan	1	0.7	496	0.6	496	0.6	0	0
ProPulse	2	1.4	310	0.4	210	0.2	100	0.1
Folicur	1	0.7	255	0.3	255	0.3	0	0
Approach	2	1.4	192	0.2	192	0.2	0	0
Proline	2	1.4	115	0.1	115	0.1	0	0
None	43	30.3	19,405	22.6				
Fungicide Total			88,891		86,516	97.3	2,375	2.7
Northarvest								
T-methyl	55	23.2	39,006	168.2	36,106	23.4	2,900	1.9
Topsin broadcast	67	28.3	38,588	166.4	36,161	23.4	2,427	1.6
Endura	66	27.8	33,887	146.1	31,877	20.6	2,010	1.3
Priaxor	15	6.3	9,124	39.3	8,799	5.7	325	0.2
Incognito	9	3.8	6,918	29.8	6,918	4.5	0	0
Tebuconazole	6	2.5	6,606	28.5	6,606	4.3	0	0
Omega	2	0.8	4,530	19.5	4,530	2.9	0	0
ProPulse	6	2.5	4,265	18.4	4,165	2.7	100	0.1
OxiDate	1	0.4	2,460	10.6	2,460	1.6	0	0
Headline	4	1.7	2,068	8.9	2,068	1.3	0	0
Calcium	1	0.4	1,656	7.1	1,656	1.1	0	0
Quadris/Amstar	3	1.3	1,530	6.6	1,155	0.7	375	0.2
Onset	3	1.3	1,159	5	1,159	0.8	0	0
Proline	6	2.5	793	3.4	565	0.4	228	0.1
Approach	3	1.3	592	2.6	592	0.4	0	0
Kocide	1	0.4	530	2.3	530	0.3	0	0
Vertisan	1	0.4	496	2.1	496	0.3	0	0
Folicur	1	0.4	255	1.1	255	0.2	0	0
None	60	25.3	23,191	100				
Fungicide Total			154,463		146,098	94.6	8,365	5.4

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

^bPercentages do not total 100 percent because some respondents treated more than once with the same product and/or treated the same acreage with more than one product.

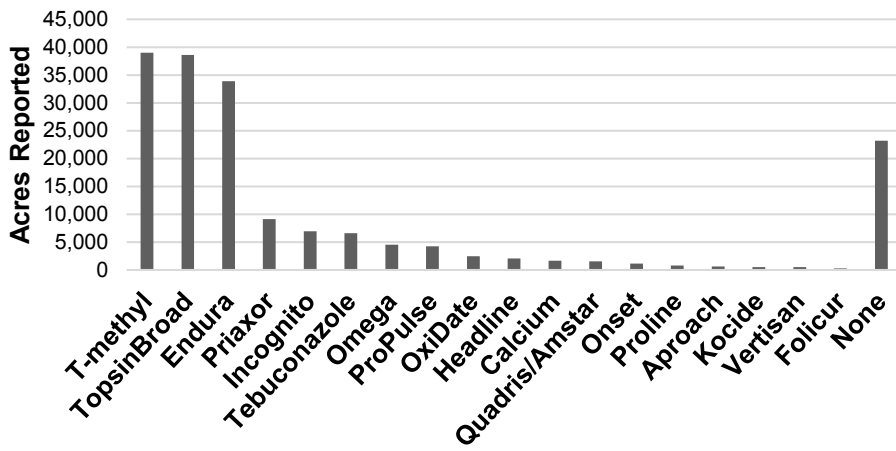


Figure 23. Northharvest foliar fungicide use in dry beans in 2018.

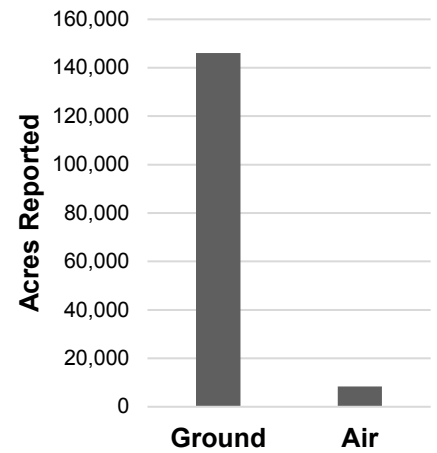


Figure 24. Northharvest fungicide application method in dry beans in 2018.

Table 37. In-furrow fungicide use in dry beans in 2018.

Seed treatment	Respondents (no.)	Respondents (%)	Total acres treated (no.) ^a	Total acres treated (%) ^a
Minnesota				
Headline	4	4.3	2,060	6
Xanthion	3	3.3	215	0.6
None	86	93.5	32,118	92.9
Fungicide Total			2,275	6.6
North Dakota				
Not specified	1	0.7	575	0.7
Tepera Plus	1	0.7	170	0.2
AZteroid FC	1	0.7	160	0.2
None	132	97.8	79,642	97.9
Fungicide Total			905	1.1
Northharvest				
Headline	4	1.8	2,060	1.8
Not specified	1	0.4	575	0.5
Xanthion	3	1.3	215	0.2
Tepera Plus	1	0.4	170	0.1
AZteroid FC	1	0.4	160	0.1
None	218	96	111,760	96.4
Fungicide Total			3,180	2.7

^aRespondents' acres only.

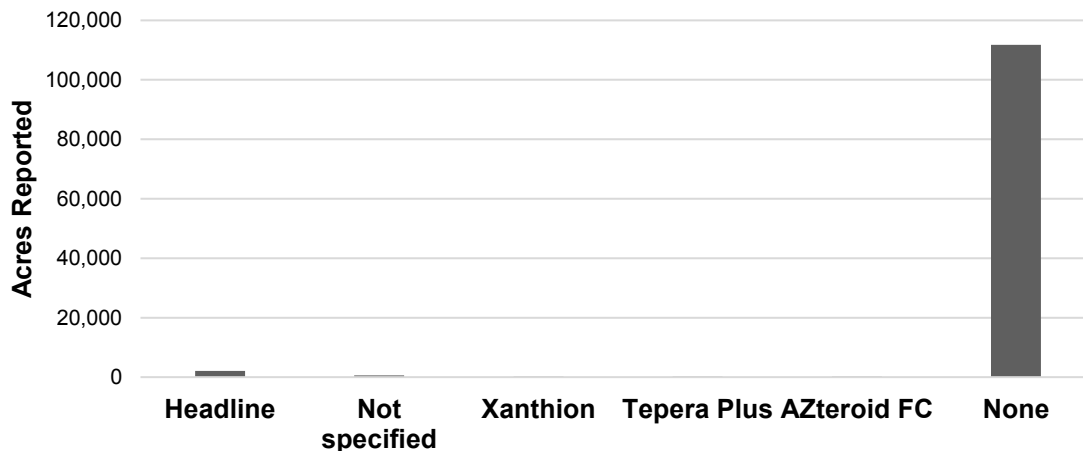


Figure 25. Northharvest in-furrow fungicide use in dry beans in 2018.

Table 38. Fungicide seed treatment use in dry beans in 2018.

Seed treatment	Respondents (no.)	Respondents (%) ^b	Total acres treated (no.) ^a	Total acres treated (%) ^{a,b}
Minnesota				
Cruiser Maxx	28	31.5	15,426	45.2
Apron XL	11	12.4	7,941	23.2
Vibrance	8	9	7,131	20.9
Dynasty	7	7.9	6,907	20.2
Rancona	10	11.2	6,450	18.9
Thiram	2	2.2	3,811	11.2
Allegiance	1	1.1	2,900	8.5
Don't know	8	9	2,894	8.5
Maxim	6	6.7	2,730	8
Cruiser Maxx Vibrance	8	9	2,275	6.7
Rancona Summit	1	1.1	2,185	6.4
Apron Maxx	4	4.5	1,530	4.5
Captan	2	2.2	877	2.6
Vibrance Maxx	1	1.1	140	0.4
None	33	37.1	8,446	24.7
Seed Treatment Total			63,197	
North Dakota				
Apron Maxx	23	17.4	18,457	23.9
Cruiser Maxx	34	25.8	15,821	20.5
Apron XL	18	13.6	11,692	15.1
Don't know	17	12.9	9,121	11.8
Vibrance Maxx	12	9.1	8,669	11.2
Maxim	12	9.1	8,345	10.8
Rancona	14	10.6	6,705	8.7
Vibrance	8	6.1	6,004	7.8
Dynasty	5	3.8	3,427	4.4
Cruiser Maxx Vibrance	5	3.8	3,272	4.2
Thiram	3	2.3	2,085	2.7
Captan	4	3	1,437	1.9
Stamina	1	0.8	610	0.8
Obvius	1	0.8	500	0.6
Streptomycin	1	0.8	197	0.3
Vitavax	1	0.8	70	0.1
None	34	25.8	18,648	24.2
Seed Treatment Total			96,412	
Northharvest				
Cruiser Maxx	62	28.1	31,247	28.1
Apron Maxx	27	12.2	19,987	17.9
Apron XL	29	13.1	19,633	17.6
Rancona	24	10.9	13,155	11.8
Vibrance	16	7.2	13,135	11.8
Don't know	25	11.3	12,015	10.8
Maxim	18	8.1	11,075	9.9
Dynasty	12	5.4	10,334	9.3
Vibrance Maxx	13	5.9	8,809	7.9
Thiram	5	2.3	5,896	5.3
Cruiser Maxx Vibrance	13	5.9	5,547	5
Allegiance	1	0.5	2,900	2.6
Captan	6	2.7	2,314	2.1
Rancona Summit	1	0.5	2,185	2
Stamina	1	0.5	610	0.5
Obvius	1	0.5	500	0.4
Streptomycin	1	0.5	197	0.2
Vitavax	1	0.5	70	0.1
None	67	30.3	27,094	24.3
Seed Treatment Total			159,609	

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

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

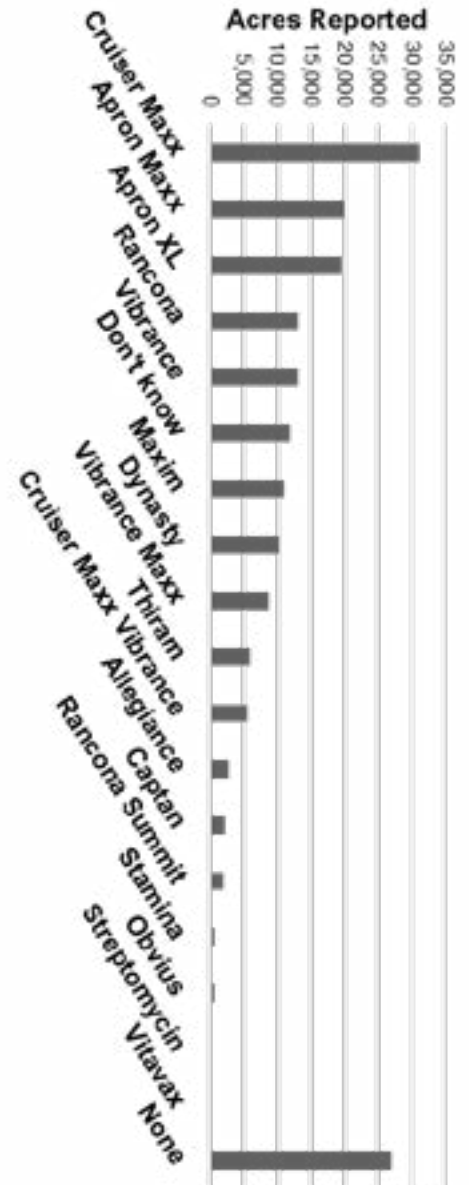


Figure 26. Northharvest fungicide seed treatment use in dry beans in 2018.

Weeds and Herbicide Use

Table 39. Worst weed problem in dry beans in 2018.

Weed ^a	Respon- dents (no.)	Respon- dents (%)	Acres reported (no.) ^{b,c}	Acres reported (%) ^{b,c}
Minnesota				
Lambsquarters	27	29	13,881	38.6
Waterhemp	30	32.3	9,049	25.1
Ragweed	16	17.2	4,279	11.9
Redroot pigweed	3	3.2	3,585	10
Nightshade	5	5.4	1,870	5.2
Sunflower	1	1.1	595	1.7
None	3	3.2	590	1.6
Foxtail	2	2.2	541	1.5
Cocklebur	1	1.1	511	1.4
Wild oat	1	1.1	375	1
Smartweed	1	1.1	373	1
Volunteer grain	2	2.2	245	0.7
Kochia	1	1.1	100	0.3
Total	93	100	35,994	100
North Dakota				
Kochia	45	31.5	29,533	34.4
Ragweed	18	12.6	12,451	14.5
Redroot pigweed	17	11.9	9,896	11.5
Lambsquarters	19	13.3	7,291	8.5
Foxtail	3	2.1	7,230	8.4
Nightshade	8	5.6	4,125	4.8
Wild mustard	4	2.8	3,382	3.9
Waterhemp	5	3.5	2,607	3
Canada thistle	5	3.5	1,520	1.8
None	2	1.4	1,276	1.5
Marestail	2	1.4	1,128	1.3
Wild buckwheat	3	2.1	1,045	1.2
Lanceleaf sage	1	0.7	1,000	1.2
Volunteer grain	2	1.4	855	1
Cocklebur	3	2.1	767	0.9
Wild oat	2	1.4	739	0.9
Biennial wormwood	2	1.4	524	0.6
Purslane	1	0.7	410	0.5
Sunflower	1	0.7	100	0.1
Total	143	100	85,879	100
Northharvest				
Kochia	46	19.5	29,633	24.3
Lambsquarters	46	19.5	21,172	17.4
Ragweed	34	14.4	16,730	13.7
Redroot pigweed	20	8.5	13,481	11.1
Waterhemp	35	14.8	11,656	9.6
Foxtail	5	2.1	7,771	6.4
Nightshade	13	5.5	5,995	4.9
Wild mustard	4	1.7	3,382	2.8
None	5	2.1	1,866	1.5
Canada thistle	5	2.1	1,520	1.2
Cocklebur	4	1.7	1,278	1
Marestail	2	0.8	1,128	0.9
Wild oat	3	1.3	1,114	0.9
Volunteer grain	4	1.7	1,100	0.9
Wild buckwheat	3	1.3	1,045	0.9
Lanceleaf sage	1	0.4	1,000	0.8
Sunflower	2	0.8	695	0.6
Biennial wormwood	2	0.8	524	0.4
Purslane	1	0.4	410	0.3
Smartweed	1	0.4	373	0.3
Total	236	100	121,873	100

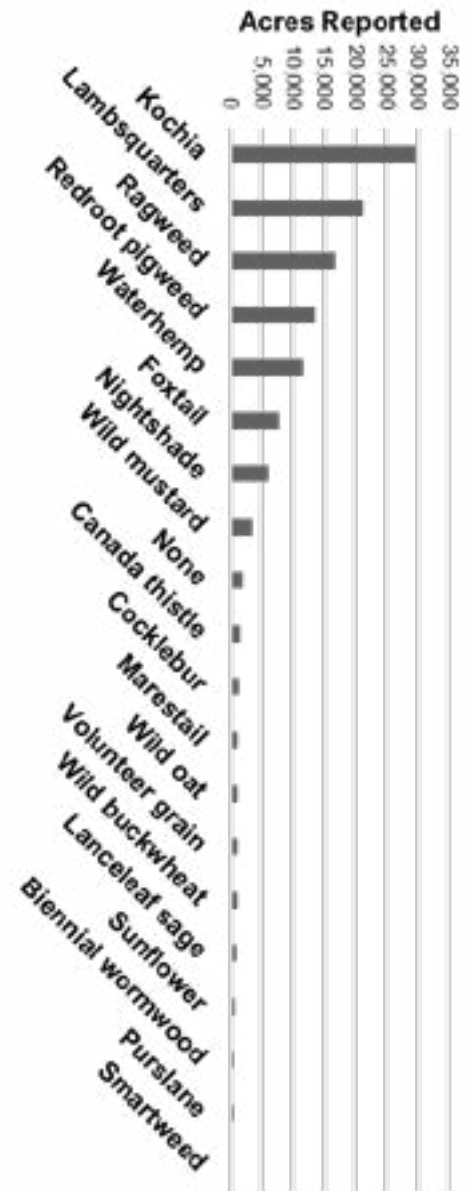


Figure 27. Northharvest worst weed problem in dry beans in 2018.

^aRanked as No. 1 weed problem by respondents.

^bRespondents' acres only.

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

Table 40. Weeds ranked as one of the three worst in dry beans in 2018.

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					Northharvest				
Lambsquarters	63	67.7	24,854	69.1	Lambsquarters	122	51.7	58,276	47.8
Ragweed	46	49.5	19,406	53.9	Kochia	86	36.4	52,910	43.4
Waterhemp	43	46.2	18,126	50.4	Ragweed	88	37.3	46,379	38.1
Redroot pigweed	23	24.7	9,945	27.6	Redroot pigweed	74	31.4	38,187	31.3
Nightshade	22	23.7	7,133	19.8	Waterhemp	54	22.9	25,070	20.6
Cocklebur	8	8.6	3,016	8.4	Nightshade	44	18.6	21,948	18
Wild buckwheat	2	2.2	2,620	7.3	Foxtail	19	8.1	16,951	13.9
Volunteer grain	9	9.7	2,386	6.6	Volunteer grain	26	11	13,758	11.3
Canada thistle	7	7.5	2,145	6	Wild mustard	24	10.2	12,724	10.4
Smartweed	6	6.5	1,888	5.2	Cocklebur	26	11	11,095	9.1
Biennial wormwood	2	2.2	1,800	5	Canada thistle	26	11	9,858	8.1
Kochia	4	4.3	1,688	4.7	Wild buckwheat	14	5.9	8,868	7.3
Foxtail	6	6.5	1,645	4.6	Wild oat	14	5.9	6,885	5.6
Sunflower	2	2.2	725	2	Biennial wormwood	12	5.1	5,773	4.7
None	3	3.2	590	1.6	Marestail	3	1.3	4,228	3.5
Wild oat	1	1.1	375	1	Smartweed	8	3.4	3,204	2.6
Lanceleaf sage	1	1.1	160	0.4	Sunflower	6	2.5	1,984	1.6
Wild mustard	1	1.1	160	0.4	None	5	2.1	1,866	1.5
Venice mallow	1	1.1	112	0.3	Lanceleaf sage	3	1.3	1,225	1
North Dakota					Black medic				
Kochia	82	57.3	51,222	59.6	Purslane	1	0.4	500	0.4
Lambsquarters	59	41.3	33,422	38.9	Volunteer canola	1	0.4	410	0.3
Redroot pigweed	51	35.7	28,242	32.9	Venice mallow	1	0.4	112	0.1
Ragweed	42	29.4	26,973	31.4	^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.				
Foxtail	13	9.1	15,306	17.8					
Nightshade	22	15.4	14,815	17.3					
Wild mustard	23	16.1	12,564	14.6					
Volunteer grain	17	11.9	11,372	13.2					
Cocklebur	18	12.6	8,079	9.4					
Canada thistle	19	13.3	7,713	9					
Waterhemp	11	7.7	6,944	8.1					
Wild oat	13	9.1	6,510	7.6					
Wild buckwheat	12	8.4	6,248	7.3					
Marestail	3	2.1	4,228	4.9					
Biennial wormwood	10	7	3,973	4.6					
Smartweed	2	1.4	1,316	1.5					
None	2	1.4	1,276	1.5					
Sunflower	4	2.8	1,259	1.5					
Lanceleaf sage	2	1.4	1,065	1.2					
Black medic	1	0.7	500	0.6					
Purslane	1	0.7	410	0.5					
Volunteer canola	1	0.7	315	0.4					

Figure 28. Northharvest weeds ranked as one of the three worst in dry beans in 2018.

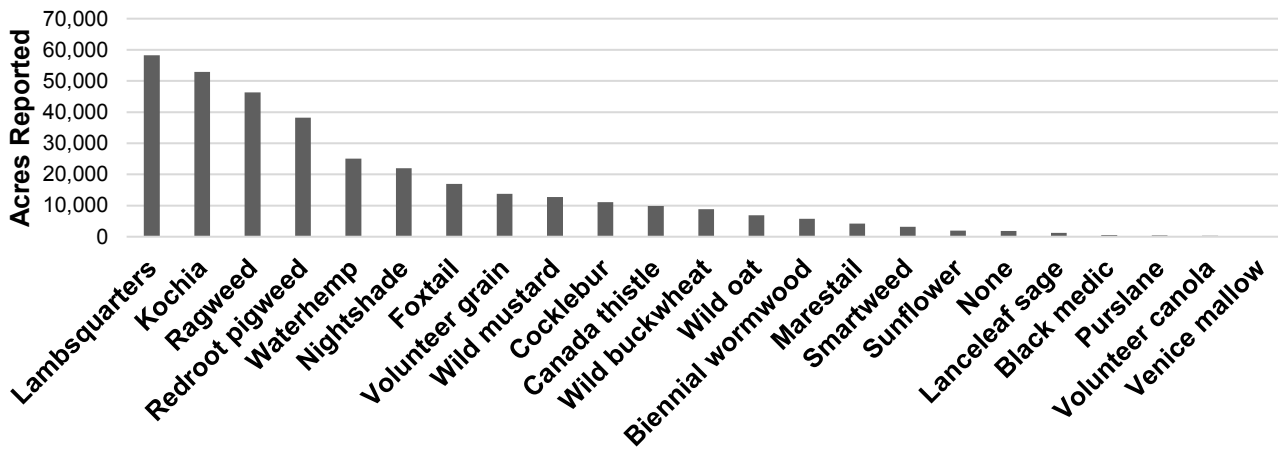


Table 41. Weed control practices used in dry beans in 2018.

Herbicide or other practice	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^b	Herbicide or other practice	Respondents (no.)	Respondents (%)	Acres reported (no.) ^a	Acres reported (%) ^b
Minnesota					Northharvest				
Raptor	54	57.4	27,938	77.8	Basagran/generics	141	59.5	96,573	79.1
Basagran/generics	52	55.3	27,284	76	Raptor	130	54.9	85,748	70.2
Reflex	55	58.5	23,957	66.7	Reflex	130	54.9	75,026	61.4
Select/generics	29	30.9	17,038	47.5	Select/generics	101	42.6	70,648	57.9
Sonalan	34	36.2	11,479	32	Sonalan	86	36.3	39,553	32.4
Prowl	16	17	10,247	28.5	Varisto	61	25.7	27,897	22.8
Outlook	20	21.3	9,213	25.7	Spartan/Charge	37	15.6	23,747	19.4
Eptam	13	13.8	6,807	19	Glyphosate (preplant)	32	13.5	22,807	18.7
Dual/generics	18	19.1	6,358	17.7	Prowl	31	13.1	17,390	14.2
Assure	10	10.6	5,018	14	Assure	23	9.7	15,446	12.7
Permit	15	16	4,483	12.5	Outlook	31	13.1	15,301	12.5
Varisto	19	20.2	4,311	12	Trifluralin	23	9.7	12,696	10.4
Rezult	8	8.5	3,177	8.9	Dual/generics	23	9.7	11,398	9.3
Trifluralin	11	11.7	2,698	7.5	Eptam	19	8	11,083	9.1
Poast	5	5.3	2,050	5.7	Rezult	29	12.2	10,734	8.8
Fusilade DX	8	8.5	1,638	4.6	Spartan Elite	16	6.8	9,011	7.4
Spartan Elite	4	4.3	1,295	3.6	Permit	25	10.5	8,063	6.6
Spartan/Charge	5	5.3	692	1.9	Poast	9	3.8	5,636	4.6
Pursuit	3	3.2	445	1.2	Pursuit	13	5.5	5,257	4.3
Glyphosate (preplant)	2	2.1	216	0.6	Glyphosate (postharvest)	9	3.8	3,615	3
Glyphosate (postharvest)	1	1.1	100	0.3	BroadAxe	6	2.5	2,276	1.9
BroadAxe	0	0	0	0	Fusilade DX	9	3.8	2,168	1.8
Cultivation	23	24.5	12,491	34.8	Cultivation	55	23.2	41,852	34.3
Manual Labor	8	8.5	833	2.3	Rotary hoe	9	3.8	6,004	4.9
Rotary hoe	1	1.1	450	1.3	Manual Labor	13	5.5	2,024	1.7
Herbicide Total			166,444		Herbicide Total			572,073	
North Dakota					^a Respondents' acres only. Includes acreage treated more than once with the same product. ^b Percentages do not total 100 percent because some respondents treated more than once with the same product and/or treated the same acreage with more than one product. ^c Herbicide total does not include cultivation, rotary hoe or manual labor acres.				
Basagran/generics	89	62.2	69,289	80.4					
Raptor	76	53.1	57,810	67.1					
Select/generics	72	50.3	53,610	62.2					
Reflex	75	52.4	51,069	59.2					
Sonalan	52	36.4	28,074	32.6					
Varisto	42	29.4	23,586	27.4					
Spartan/Charge	32	22.4	23,055	26.7					
Glyphosate (preplant)	30	21	22,591	26.2					
Assure	13	9.1	10,428	12.1					
Trifluralin	12	8.4	9,998	11.6					
Spartan Elite	12	8.4	7,716	9					
Rezult	21	14.7	7,557	8.8					
Prowl	15	10.5	7,143	8.3					
Outlook	11	7.7	6,088	7.1					
Dual/generics	5	3.5	5,040	5.8					
Pursuit	10	7	4,812	5.6					
Eptam	6	4.2	4,276	5					
Poast	4	2.8	3,586	4.2					
Permit	10	7	3,580	4.2					
Glyphosate (postharvest)	8	5.6	3,515	4.1					
BroadAxe	6	4.2	2,276	2.6					
Fusilade DX	1	0.7	530	0.6					
Cultivation	32	22.4	29,361	34.1					
Rotary hoe	8	5.6	5,554	6.4					
Manual Labor	5	3.5	1,191	1.4					
Herbicide Total			405,629						

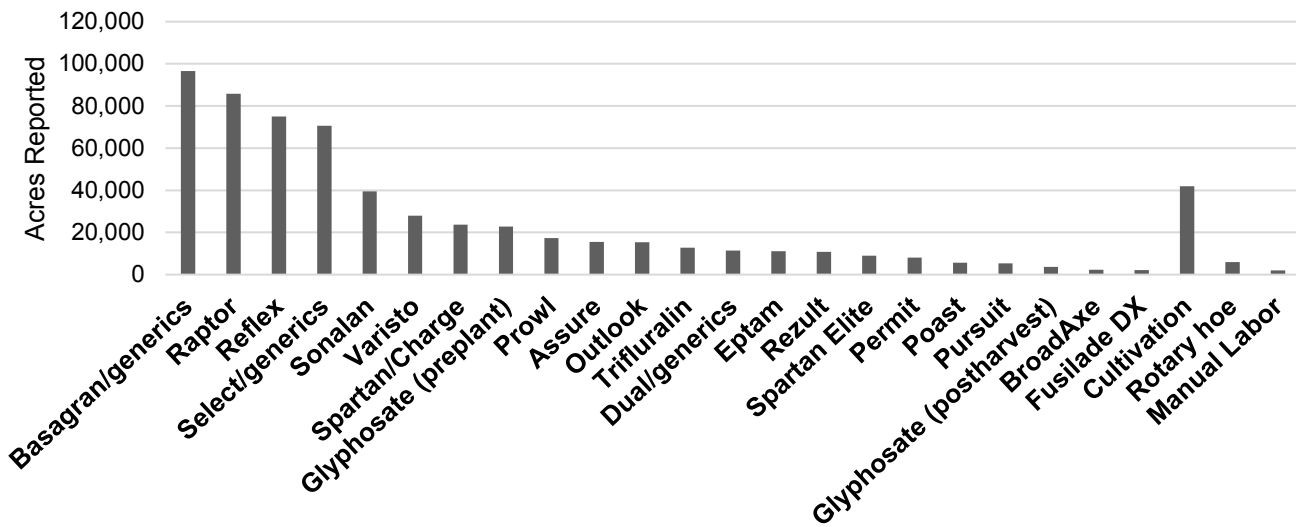


Figure 29. Northharvest weed control practices used in dry beans in 2018.

Scouting and Threshold Practices

Table 42. Scouting practices in dry beans in 2018.

	Insects		Diseases		Weeds	
	Respon- dents (no.)	Respon- dents (%)	Respon- dents (no.)	Respon- dents (%)	Respon- dents (no.)	Respon- dents (%)
Minnesota						
Crop consultant	43	46.2	41	44.1	40	43.5
Grower	45	48.4	43	46.2	45	48.9
Both	5	5.4	9	9.7	7	7.6
Don't scout	0	0	0	0	0	0
Total	93	100	93	100	92	100
North Dakota						
Crop consultant	62	43.1	66	45.8	55	38.5
Grower	69	47.9	68	47.2	76	53.1
Both	6	4.2	8	5.6	11	7.7
Don't scout	7	4.9	2	1.4	1	0.7
Total	144	100	144	100	143	100
Northharvest						
Crop consultant	105	44.3	107	45.1	95	40.4
Grower	114	48.1	111	46.8	121	51.5
Both	11	4.6	17	7.2	18	7.7
Don't scout	7	3	2	0.8	1	0.4
Total	237	100	237	100	235	100

Table 43. Use of economic thresholds for insects in dry beans in 2018.

	Respondents (no.)	Respondents (%)
Minnesota		
Economic thresholds used	85	93.4
Economic thresholds not used	6	6.6
Total	91	100
North Dakota		
Economic thresholds used	135	95.7
Economic thresholds not used	6	4.3
Total	141	100
Northharvest		
Economic thresholds used	220	94.8
Economic thresholds not used	12	5.2
Total	232	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. PP-1265.
- 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. E-1884.
- 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. E-1841.
- 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. E-1802.
- 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. E-1750.
- 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. E-1710.
- 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. E-1640.
- 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. E-1602.
- 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. E-1522 (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. E-1421 (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. E-1421 (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. PP-1392.
- 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. PP-1265 (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. PP-1265 (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 Northarvest 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 Northarvest 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 2018 DRY BEAN CROP

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

Dry Bean Production in 2018	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 2018		
Bean Class	Variety	Acres
Black	Black Cat	
	Eclipse	
	Zenith	
	Zorro	
	Other black (please specify)	
Great Northern	Aries	
	Matterhorn	
	Orion	
	Powderhorn	
	Taurus	
	Other GN (please specify)	
Kidney	Beluga	
	Big Red	
	Cabernet	
	California Early LRK	
	Clouseau	
	Foxfire	
	Majesty	
	Montcalm	
	Pink Panther	
	Red Hawk	
	Rosie	
	Snowdon	
	Talon	
	Yeti	
Other kidney (please specify)		
Navy	Blizzard	
	Ensign	
	Medalist	
	Merlin	
	Norstar	
	T9905	
	Teton	
	Vigilant	

Dry Bean Classes, Varieties and Acres Grown in 2018		
Bean Class	Variety	Acres
	Vista	
	Other navy (please specify)	
Pink	Floyd	
	Rosetta	
	Sedona	
	Other pink (please specify)	
Pinto	Buster	
	El Dorado	
	La Paz	
	Lariat	
	Maverick	
	Monterrey	
	ND 307	
	ND Palomino (SD)*	
	Radiant (SD)*	
	Santa Cruz	
	Sequoia	
	Sinaloa	
	Sonora	
	Stampede	
	Staybright SD	
	Torreón	
	Vibrant (SD)*	
	Windbreaker	
Other pinto (please specify)		
Small Red	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.

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

Production Problems

For each production problem, please fill in acreage affected for each bean class you produced in 2018. 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)			
Planting rate (seeds per acre)			
Delayed planting			
Diseases			
Drought			
Emergence/stand			
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)			

Did you experience yield loss in your 2018 dry bean crop due to dicamba drift?	
Yes	No

Will potential injury from dicamba drift prevent you from planting dry beans in 2019?	
Yes	No

If you answered 'Yes', how much yield loss occurred to your dry beans due to dicamba drift? Space is provided for up to three bean classes.	
Bean Class	Yield Loss

Agronomy

Please list row spacing, planting rate and established stand for each bean class you planted in 2018.			
Bean Class	Row Spacing (inches)	Planting Rate (plants per acre)	Established Stand (plants per acre)

If known, what were the nearest and farthest distances from the source of dicamba drift to injury in the affected field(s)?
Nearest distance:
Farthest distance:
Unknown

Did the size of your purchased seed affect your ability to plant your intended dry bean acreage in 2018?		
Problem	Variety(ies)	Number of Acres (short or long)
Not enough seed		
Too much seed		
No problem		

If known, how long after dicamba application (at the drift source) did symptoms appear on dry beans?
Time for symptoms to appear:
Unknown

Please list the crops in your dry bean crop rotation program for all fields you planted to dry bean in 2018.	
Year	List of Crops
2017	
2016	
2015	
2014	

If you experienced dicamba drift on your dry beans, was there a successful resolution or settlement with the party responsible for dicamba drift?	
Yes	No

Please list acreage for each tillage type listed below for your dry bean fields in 2018.

Tillage Type	Acreage	Tillage Type	Acreage
Conventional		Strip-till	
Minimum		No-till	

Cover Crops in Dry Beans in 2018. Please answer the questions in the table below.

Did you use a cover crop on your dry bean ground in 2018? 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 During dry bean After dry bean
 dry beans production 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 2018?

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 2018 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 2018? 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 2018?

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 2018.
 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 2018.
 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 2018. 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 2018. 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 2018. 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
			air	ground
Foliar Fungicide Products				
1. Aproach	12. Microthiol	23. Satori		
2. Aprovia Top	13. Omega	24. Serenade		
3. Bravo	14. Onset	25. Switch		
4. Cannonball	15. Orius	26. T-methyl		
5. Champ	16. Priaxor	27. Tebuzol		
6. Echo	17. Proline	28. Topsin		
7. Endura	18. ProPulse	29. Vertisan		
8. Equation	19. Quadris	30. None used		
9. Headline	20. Quadris Opti	31. Other (specify)		
10. Incognito	21. Quilt			
11. Kocide	22. Rovral			

Seed Treatment Fungicides Used on Dry Beans in 2018. 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	10. Maxim
2. Apron Maxx	11. Mertect
3. Apron XL	12. Obvious
4. Captan	13. Prevail
5. Chloroneb	14. Rancona
6. Cruiser Maxx	15. Rancona Summit
7. Cruiser Maxx Vibrance	16. Rizolex
8. Dynasty	17. Stamina
9. EverGol Energy	18. Thiram

In-furrow Fungicide Applications Made on Dry Beans in 2018. 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

Worst Disease Problem in Dry Beans in 2018. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.			
Disease	Rank	Disease	Rank
Anthraxnose		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 2018. 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. Permit	19. Spartan Charge
2. Basagran/gen.	11. Poast	20. Spartan Elite
3. BroadAxe	12. Prowl	21. Trifluralin
4. Dual/generics	13. Pursuit	22. Varisto
5. Eptam	14. Raptor	23. Cultivation
6. Fusilade DX	15. Reflex	24. Rotary hoe
7. Glyphosate (preplant)	16. Rezult	25. Manual labor
8. Glyphosate (postharvest)	17. Select/gen.	26. None
9. Outlook	18. Sonalan	27. Other (specify)

Worst Weed Problem in Dry Beans in 2018. Please rank 1-3, with 1 = worst. Please rank ONLY the top three.			
Weed	Rank	Weed	Rank
Biennial wormwood		Smartweed	
Black medic		Sunflower	
Canada thistle		Venice mallow	
Cocklebur		Volunteer canola	
Foxtail		Volunteer grain	
Kochia		Waterhemp	
Lambsquarters		Wild buckwheat	
Lanceleaf sage		Wild mustard	
Nightshade		Wild oat	
Ragweed		None	
Redroot pigweed		Other (specify)	

Preharvest or Desiccants Used on Dry Beans in 2018. 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
2018 Dry Bean Grower Survey!

Cover photos (top to bottom)

J. Orsorno (NDSU)

kidney beans

G. Endres (NDSU)

dry beans emerging

J. Orsorno (NDSU)

dry bean field

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

NDSU encourages you to use and share this content, but please do so under the conditions of our Creative Commons license.

You may copy, distribute, transmit and adapt this work as long as you give full attribution, don't use the work for commercial purposes and share your resulting work similarly. For more information, visit www.ag.ndsu.edu/agcomm/creative-commons.

County commissions, North Dakota State University and U.S. Department of Agriculture cooperating. NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable. Direct inquiries to Vice Provost for Title IX/ADA Coordinator, Old Main 201, NDSU Main Campus, 701-231-7708, ndsu.eoaa.ndsu.edu. This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881.