

1995 Dry Bean Grower Survey

of Pest Problems and Pesticide Use in Minnesota and North Dakota

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NDSU EXTENSION SERVICE

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This is the eighth annual survey of pest problems, pesticide use and grower practices of the Northharvest Bean Growers Association, an association of dry bean growers in Minnesota and North Dakota. Results of previous surveys dated 1987-94 have been published (1, 2, 3, 4, 5, 6, 8). There was no survey in 1993.

The survey form (Figure 1, pages 3-6) was designed with input from research and extension faculty at North Dakota State University, the University of Minnesota, and the directors of Northharvest Bean Growers Association. The survey was mailed on November 15, 1995, to all 3,893 Northharvest dry bean growers in the two-state area. The surveys were sorted by Northharvest production district, with the district number marked in the corner of the form. Except for district designation, the survey was anonymous. For purposes of this discussion, districts are identified as MN1 through MN5 and ND1 through ND5 (Figure 2).

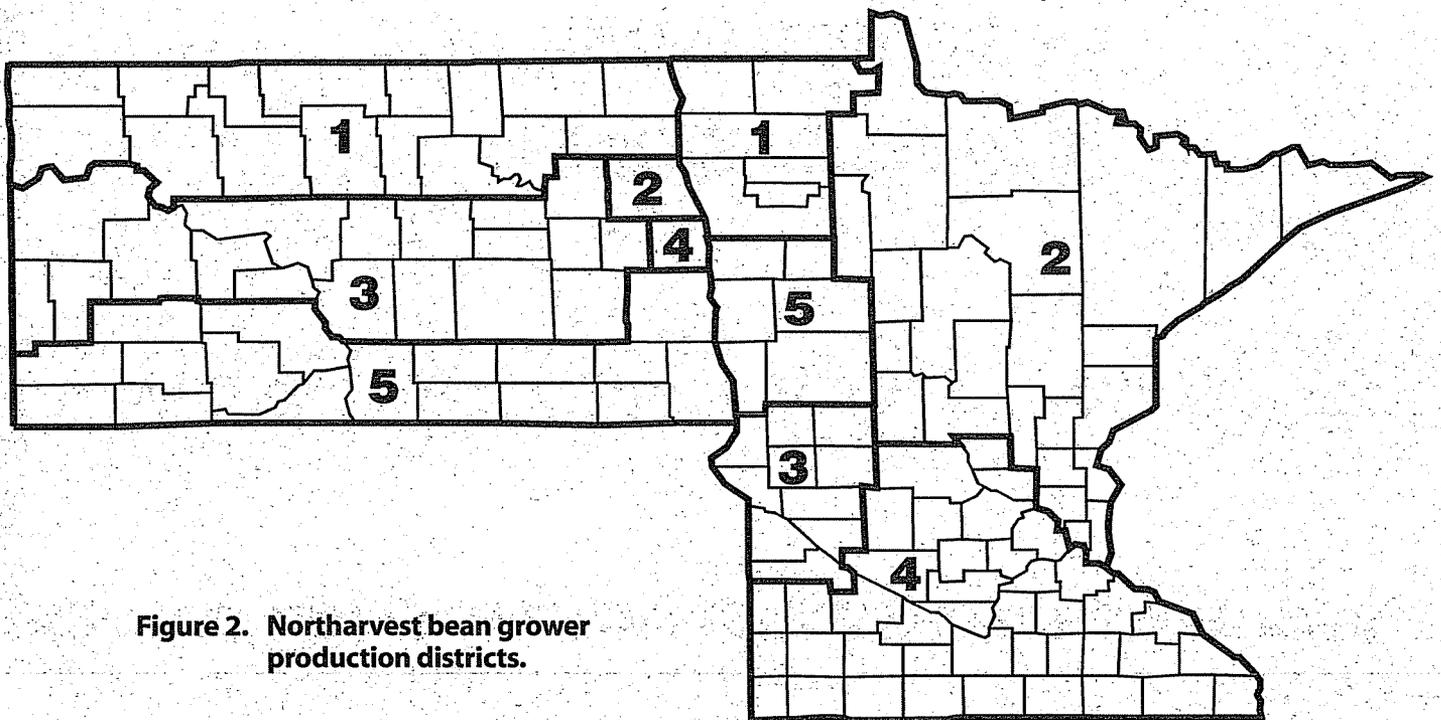


Figure 2. Northharvest bean grower production districts.



NDSU EXTENSION SERVICE

November 15, 1995

Plant Pathology
North Dakota State University, Box 5012, Fargo, ND 58105
(701) 231-8866

TO: All Northarvest Dry Bean Growers

FROM: Art Lamey
Extension Plant Pathologist
North Dakota State University

SUBJECT: Survey of Pest Problems and Pesticide Use in 1995

This is the eighth survey of Northarvest dry bean growers. Designed by research and extension specialists from North Dakota and Minnesota with suggestions from the Northarvest board of directors, it seeks specific information on pest problems and pesticide use in dry beans. Results help define research and extension needs, future pesticide needs, and the potential effect of any pesticide cancellations.

Please take the time to complete the survey on the reverse side and return it in the enclosed envelope, which is addressed with postage paid. Your reply is important and will help guide the future of the dry bean industry. Please answer the questions as completely as possible. **Please be sure to provide information on acres treated or planted whenever this question is asked.** Please be sure to report the acres for each variety grown, as well as acres treated by a pesticide. Accurate information will help us the most. Please feel free to add explanations or written comments that clarify your practices or express your concerns. Results will be published in future issues of the *Northarvest Bean Grower*.

In one question, you are asked to rank your most serious disease and weed problems up to a total of 3. If you had no serious problems, just circle "None" and go on to the next question. If you had two serious weed or disease problems, please put a "1" beside the worst problem, and a "2" beside the next worst problem. Use a "3" only if you had a third serious problem, but please don't rank minor problems.

May we please have your reply by December 15, 1995.

The mailing list for this questionnaire was derived from *Northarvest Bean Grower* magazine mailing list. If you no longer wish to receive the magazine or would like to notify them of address changes, please include the mailing label from this packet or include your name and your old and new address including zip code.

Please circle or fill in the requested information on pest problems and pesticide use on your 1995 dry bean crop.



Total acres planted in 1995 _____
 Irrigated acres _____ Dryland acres _____
 Total acres harvested _____
 Acres with hail damage _____
 Acres with water damage _____

Seed Source
 Western Grown _____
 Northharvest Grown _____

Acres
 Planted

State and County Where Grown
 (If beans are grown in more than one county,
 list each county and acres)

State	County	Acres
Minnesota	_____	_____
North Dakota	_____	_____
South Dakota	_____	_____

Biggest Weather Problem in Dry Beans in 1995
 (Circle One)

	Acres Lost	Bean Class
Drought	_____	_____
Flooding	_____	_____
Frost	_____	_____
Hail	_____	_____
Wind/sandblasting	_____	_____
Heat stress	_____	_____
Other	_____	_____

Variety Grown in 1995

Variety	Acres
Pinto	
Arapaho	_____
Bill Z	_____
Fargo	_____
Fiesta	_____
Nodak	_____
Othello	_____
RS101	_____
Topaz	_____
Other (specify)	_____
Navy	
Agri 1	_____
Mayflower	_____
Midland	_____
Norstar	_____
Schooner	_____
Upland	_____
Vista	_____
Voyager	_____
Other	_____
Kidney	
Cal. Early LRK	_____
Montcalm	_____
Sacramento	_____
Other (specify)	_____

Biggest Production Problem in Dry Beans in 1995
 (Circle One)

	Acres Lost	Bean Class
Applied herbicide injury	_____	_____
Herbicide drift injury	_____	_____
Delayed planting	_____	_____
Emergence/stand	_____	_____
Harvest	_____	_____
Disease	_____	_____
Insects	_____	_____
Micronutrient deficiency	_____	_____
Weeds	_____	_____
None	_____	_____
Other (specify)	_____	_____

Black Turtle
 (specify) _____
 Pink
 (specify) _____

Worst Weed Problems in Dry Beans in 1995
 (Rank 1-3; 1 = worst)

_____ Cocklebur	_____ Ragweed
_____ Nightshade	_____ Lambsquarters
_____ Foxtail	_____ Redroot pigweed
_____ (pigeon grass)	_____ Wild mustard
_____ Kochia	_____ Wild oat
_____ Canada thistle	_____ Other (specify)
_____ Volunteer grain	_____

Non-Chemical Weed Management
 (Count double passes as double acres)

Practice	Acres Treated	#Passes
Cultivation	_____	_____
Rotary hoe/harrow	_____	_____
No herbicide	_____	_____

Other Market Class/Variety (specify) _____

Evaluate Weed Control Chemical

Mark weed control used and indicate areas treated for each item. Count double application, double cultivation, etc., as double acres.

Weed Control Used	Acres Treated	Weed Control		
		Good	Fair	Poor
Roundup/generics (preplant)	_____	1	2	3
Eptam (fall)	_____	1	2	3
Eptam (spring)	_____	1	2	3
Trifluralin (fall)	_____	1	2	3
Trifluralin (spring)	_____	1	2	3
Trifluralin + Eptam	_____	1	2	3
Sonalan (fall)	_____	1	2	3
Sonalan (spring)	_____	1	2	3
Lasso/generics	_____	1	2	3
Dual	_____	1	2	3
Prowl	_____	1	2	3
Pursuit	_____	1	2	3
Basagran/generics	_____	1	2	3
Poast/Poast Plus	_____	1	2	3
Other _____	_____	1	2	3
Desiccants				
Sodium Chlorate	_____	1	2	3
Gramoxone Extra	_____	1	2	3

Insecticides Used on Dry Beans in 1995

Insecticide	No. Acres Treated	No. of Sprays
_____	_____	_____
_____	_____	_____
_____	_____	_____

Worst Insect/Mite Problem in 1995

- _____ Grasshoppers
- _____ Leafhoppers
- _____ Spider Mites
- _____ Seed Corn Maggot

Fungicides Used on Dry Beans in 1995

Fungicide	No. Acres Treated	No. of Sprays
Bravo	_____	_____
Maneb	_____	_____
Champion/Champ	_____	_____
Kocide	_____	_____
Benlate (broadcast)	_____	_____
Benlate (banded)	_____	_____
Tilt	_____	_____
Topsin (broadcast)	_____	_____
Topsin (banded)	_____	_____
Thiolux	_____	_____
Other	_____	_____

**Worst Disease Problems in 1995
(Rank 1-3; 1 = worst)**

- _____ Alternaria
- _____ Bacterial blight
- _____ Root Rot
- _____ Rust
- _____ White Mold
- _____ None

Please see back side for more questions!

Crop Rotation

Please specify practices below:

1. Crop rotation _____ # acres.
2. Preceding crop _____
How long since previous dry beans _____?

Micronutrient Use

Acres treated with zinc _____

No. of sprays _____

COMMENTS:

Results of the survey will be published in Northarvest Bean Grower
Please return by December 15, 1995 - Thank you - Art Lamey, Extension Plant Pathologist, NDSU

Responses

We received 680 useable responses, or a return rate of 18% (Table 1). The useable response rate is about the same as in 1994 (6), higher than the 15% in 1992 and 1991 and lower than the 19-23% useable response rate of 1987-1990. The surveys returned in 1995 represented 205,787 acres (A), or 26% of the Northharvest total of 790,000 A planted in 1995 (7). This is a similar response rate to previous surveys.

Responses by district are shown in Table 2. MN1, which comprises primarily the Red River Valley, represents 49% or Minnesota respondents' acres. ND1, which is the northernmost part of North Dakota, represents 31% of North

Dakota respondents' acres. These values are similar to those for 1994. Compared to 1994, there were more acres represented in responses from MN1, MN5, ND5, and ND3

Irrigation

Irrigation was used on 6% of Northharvest respondents' acres (Table 3), down from 9% in 1994. In Minnesota, irrigation was used on 14% of respondents' acres, down from 27% in 1994 and 40% in 1992 (3). In MN2 it was down from 85% in 1994 to 75% in 1995 in MN2. Irrigation was used on only 3% of North Dakota respondents' acres, down from 5% in 1994. The irrigated acres in ND5 have fluctuated from 3% in 1992 to 20% in 1994 to 10% in 1995.

Table 1. Number of Northharvest dry bean growers contacted, respondents, total acres and acres planted by Minnesota and North Dakota respondents in 1995.

	Growers			Acres Planted		
	Contacted Number	Responded Number	Responded %	Total ^a Number	Respondents Number	Respondents' Acres % of Total
Minnesota	1,085	221	20.4	160,000	55,762	34.9
North Dakota	2,808	459	16.3	570,000	150,025	26.3
Northharvest Total	3,893	680	17.5	730,000	205,787	28.2

^aTotal acres planted in state according to USDA data.

Table 2. Number of respondents and acres planted in 1995 by respondents in each Northharvest district of Minnesota and North Dakota.

Northharvest District	Respondents		Acres Planted	
	Number	% of Survey Total	Number ^a	% of Survey Total ^a
Minnesota				
MN1	65	29.4	27,263	48.9
MN2	17	7.7	5,164	9.3
MN3	44	19.9	8,089	14.3
MN4	53	24.0	6,053	10.9
MN5	42	19.0	9,193	16.5
MN Total	221	100.0	55,762	100.0
North Dakota				
ND1	142	30.9	46,415	30.9
ND2	80	17.4	27,586	18.4
ND3	88	19.2	30,766	20.5
ND4	66	14.4	23,415	15.6
ND5	83	18.1	21,843	14.6
ND Total	459 ^b	100.0	150,025 ^c	100.0
Northharvest Total	680		205,787	

^a Respondents' acres only

^b 67.5% of all respondents

^c 72.9% of all respondents' acres

Table 3. Acres irrigated in 1995 by respondents in each Northharvest district of Minnesota and North Dakota.

Northharvest District	Acres Irrigated ^a	
	Acres	% of District Acres
Minnesota		
MN1	425	1.6
MN2	3,869	74.9
MN3	127	1.6
MN4	737	12.2
MN5	2,870	31.2
MN Total	8,028	14.4
North Dakota		
ND1	1,123	2.4
ND2	0 ^b	0
ND3	1,141	3.7
ND4	530	2.3
ND5	2,160	9.9
ND Total	4,954	3.3
Northharvest Total	12,982	6.3

^a Respondents' acres only.

^b No irrigated acres reported for this district.

Zinc Usage

Zinc, a commonly used micronutrient on dry beans, was used on 57% of respondents' acres (Table 4). This is three times the percentage of respondents' acres treated in 1990-1992 (2, 3, 4.), but only slightly higher than the percentage treated in 1994. Almost identical percentages were treated by respondents from each state.

Table 4. Acres harvested in 1995 by respondents in each Northharvest district in Minnesota and North Dakota.

Northharvest District	Acres Harvested	% of District Acres
Minnesota		
MN1	24,299	89.1
MN2	5,034	97.5
MN3	7,061	87.3
MN4	5,394	89.1
MN5	8,858	96.4
MN Total	50,646	90.8
North Dakota		
ND1	43,792	94.3
ND2	23,166	84.0
ND3	29,500	95.9
ND4	22,009	94.0
ND5	19,465	89.1
ND Total	137,932	91.9
Northharvest Total	188,578	91.6

Table 5. Acres seeded with Western grown and to Northharvest grown seed in 1995 in each Northharvest district.

Northharvest District	Western Grown Seed		Northharvest Grown Seed	
	Acres Planted	Respondents' Acres Planted (%)	Acres Planted	Respondents' Acres Planted (%)
Minnesota				
MN1	24,698	90.6	2,427	8.9
MN2	4,376	84.7	240	4.6
MN3	6,418	79.3	1,254	15.5
MN4	3,756	62.1	972	16.1
MN5	6,840	74.4	1,450	15.8
MN Total	46,088	82.7	6,343	11.4
North Dakota				
ND1	29,153	62.8	9,677	20.8
ND2	21,272	77.1	4,629	16.8
ND3	14,392	46.8	14,178	46.1
ND4	18,317	78.2	4,172	17.8
ND5	12,139	55.6	8,402	38.5
ND Total	95,273	63.5	41,058	27.4
Northharvest Total	141,361	68.7	47,401	23.0

Use of Western Grown and Northharvest Grown Seed

In previous surveys respondents were asked about the use of bagged and tagged seed. This is the first time that respondents were asked about geographic origin of their seed, whether it was "Western grown" or Northharvest grown. Although Western-grown seed was most commonly used (Table 5), 23% of all seed planted was Northharvest-grown seed. Minnesota respondents planted 11% of their acres with Northharvest-grown seed and North Dakota respondents planted 27% with Northharvest-grown seed. The district with the highest percentage of acres planted with Northharvest-grown seed was ND3, where 46% of acres were planted with Northharvest-grown seed. It is also the Northharvest district that grows the largest amount of seed.

Varieties Grown

Othello pinto, which was the leading Northharvest variety in 1992 and 1994 (3, 6), continued to be the leading variety in 1995, as 35% of Northharvest survey respondents planted this variety on 25% of all dry bean acres reported (Table 6). Although this figure is still high, it is down

Table 6. Varieties grown^a in 1995 by all Northharvest respondents in Minnesota and North Dakota.

Variety	Type ^c	Respondents		Acres Planted ^b	
		Number	%	Number	%
Arapaho	P	23	3.4	1,707	0.8
Bill Z	P	48	7.1	4,985	2.4
Fiesta	P	41	6.0	7,690	3.7
Nodak	P	104	15.3	17,263	8.4
Olathe	P	20	2.9	2,692	1.3
Othello	P	236	34.7	50,790	24.7
RS 101	P	42	6.2	3,892	1.9
Sierra	P	10	1.5	1,309	0.6
Topaz	P	167	24.6	27,291	13.3
Agri 1	N	64	9.4	7,723	3.7
Mayflower	N	19	2.8	1,330	0.6
Midland	N	38	5.6	4,476	2.2
Norstar	N	105	15.4	12,820	6.2
Schooner	N	76	11.2	8,797	4.3
Upland	N	97	14.3	9,861	4.8
Vista	N	51	7.5	4,413	2.1
Montcalm	DRK	51	7.5	7,163	3.5
Calif. Early	LRK	14	2.1	1,102	0.5
—	B	63	9.3	8,238	4.0
—	PK	30	4.4	6,606	3.2

^aIncludes all varieties reported grown on more than 1,000 acres.

^bRespondents' acres only.

^cB = Black; DRK = Dark Red Kidney; LRK = Light Red Kidney; N = Navy; P = Pinto; PK = Pink

slightly from 1994. Othello accounted for 41% of the pinto bean acres (Table 7).

Topaz pinto continued to be the second most commonly planted Northharvest variety, planted by 25% of respondents on 13% of dry bean acres reported. This is similar to 1994. Nodak pinto continued to be the third most commonly planted variety, planted by 15% of Northharvest respondents on 8% of respondents' acres.

Norstar was the top navy variety, planted by 15% of respondents on 6% of respondents' acres, followed by Upland and Schooner, planted by 14% and 11% of respondents on 5% and 4% of respondents' acres, respectively. This is the first year that Norstar was the dominant navy variety, planted on 22% of navy acres in the two states.

Other varieties commonly grown were Agri 1 navy, Fiesta pinto and Montcalm dark red kidney, each planted on nearly 4% of respondents' acres. Montcalm was planted on 80% of kidney acres in the two states.

Navy bean was the most commonly grown class in Minnesota, with 39% of respondents' acres planted to that class (Table 8). Pinto was the second most commonly planted class in Minnesota, with 32% of respondents' acres, and 18% was planted to kidney beans.

Table 7. Leading varieties of dry bean, by class, grown in Minnesota and North Dakota in 1995.

Class/Variety ^a	Minnesota	North Dakota	Northharvest Total
- % of respondents' acres for that class of bean -			
Pinto			
Othello	23.4	43.9	41.0
Topaz	25.3	21.5	22.0
Nodak	2.2	15.9	13.9
Fiesta	29.3	2.4	6.2
Navy			
Norstar	15.8	26.0	22.1
Upland	12.9	19.5	17.0
Schooner	11.1	17.7	15.2
Agri 1	16.6	11.4	13.3
Kidney			
Cal. Early (LRK)	11.1	0	10.7
Montcalm (DRK)	79.5	100.0	80.3

^aVarieties grown on more than 10% of respondents' acres, for that class, in at least one state.

Pinto bean was the most commonly grown class in North Dakota, with 60% of respondents' acres planted to that class (Table 8). Navy was the second most commonly planted class in North Dakota, with 28% of respondents' acres planted to navy beans. Only 5% was planted to kidney beans.

The class of bean varied by district, with 58% of respondents' dry bean acres in MN1 planted to pinto beans and 30% to navy beans, 68% of respondents' acres in MN2 planted to kidney beans and 20% to pink beans, 76% of respondents' acres in MN3 planted to navy beans and 14% to kidney beans, 47% of respondents' acres in MN4 planted to navy beans and 42% to kidney beans, and 45% of respondents' acres in MN5 planted to navy beans and 28% to kidney beans (Table 8).

In North Dakota, 86% of respondents' acres in ND1 were planted to pinto beans, 53% of respondents' acres in ND2 were planted to pinto beans and 42% to navy beans, 88% of respondents' acres in ND3 were planted to pinto beans and 10% to navy beans, 56% of respondents' acres in ND4 were planted to pinto beans and 33% to navy beans, and 54% of respondents' acres in ND5 were planted to pinto beans and 45% to navy beans (Table 8).

Table 8. Class of dry bean grown in 1995 by respondents in each district in Minnesota and North Dakota.

Northharvest District	Pinto	Navy	Kidney	Black	Pink	Other
----- Acres Planted ^a -----						
Minnesota						
MN1	57.7	29.5	0.7	5.4	0.2	6.5
MN2	0.4	12.2	67.8	0	19.5	0
MN3	4.6	76.1	13.6	0	0	5.7
MN4	4.8	46.5	42.2	5.5	0	1.0
MN5	12.8	44.7	27.6	9.0	1.2	4.8
MN Total	31.5	39.0	17.7	4.7	2.1	4.9
North Dakota						
ND1	86.0	9.3	0	0.4	3.1	1.2
ND2	52.7	41.6	0	4.8	0.7	0.2
ND3	87.9	9.8	0	1.5	0.8	0
ND4	55.6	32.6	1.2	7.1	0.9	2.7
ND5	53.7	44.5	0.4	1.5	0	0
ND Total	70.8	24.1	0.2	2.7	1.4	0.8
Northharvest Total	60.2	28.1	5.0	3.2	1.6	1.9

^aMinnesota districts are Bean Council districts, not Northharvest districts.

Weather Problems

The worst weather problem in 1995 was flooding and wet weather, as reported for 73% of Minnesota respondents' acres, 70% of North Dakota respondents' acres and 71% of all Northarvest respondents' acres (Table 9). This is even higher than in 1994 when 61% of all Northarvest respondents' acres were reported with flooding or wet weather problems. Acres lost to flooding were 7% in Minnesota, 6% in North Dakota and 6% for all of Northarvest acres, which is about half of the acres lost in 1994. Thus, even though more acres were reported with flooding and wet problems, fewer acres were lost to flooding and wet conditions. Losses to drought, frost and hail were minimal. Respondents reported that 6% of Minnesota respondents' 5% of North Dakota respondents' and 5% of all respondents' acres were damaged by heat stress; acres lost to heat stress were minimal.

Flooding and wet conditions damaged 91% of MN1 respondents' acres, 84% of MN3 respondents' acres, 63% of MN5 respondents' acres, 92% of ND2 respondents' acres,

87% of ND5 respondents' acres and 78% of ND4 respondents' acres (Table 10). Overall, damage was more extensive than in 1994. Respondents lost 10% of their acres in MN1 to flooding and wet conditions and 11% of their acres in ND2. As noted before, even though flooding damage was more extensive than in 1994, fewer acres were lost to flooding.

Heat stress damage was most common in MN2, with 23% of beans on respondents' acres damaged, followed by ND2 with 16% damaged and MN4 with 11% damaged. Losses were minimal in all districts.

Acres Harvested

Respondents harvested 92% of their planted acres in 1995, compared to 81% in 1994. Acres harvested ranged from 98% in MN2, 96% in MN5, 96% in ND3, and 94% in ND1 and ND4 to 89% in MN1, MN4 and ND5 to 84% in ND2 (Table 11).

Table 9. Worst weather problem in 1995 for respondents in Minnesota and North Dakota.

Worst Weather Problem Reported	- Respondents -		----- Acres Reported ^a -----			
	Number	%	Number	%	Acres Lost	%
Minnesota						
Drought/dry	5	2.6	563	1.0	80	0.1
Flooding/wet	133	67.9	40,892	73.3	3,748	6.7
Frost	1	0.5	400	0.7	160	0.3
Hail	4	2.0	720	1.3	0	0
Wind/sandblast	6	3.1	1,013	1.8	7	tr ^b
Heat stress	20	10.2	3,070	5.5	27	tr
None	9	4.6	1,612	2.9	—	—
North Dakota						
Drought/dry	17	4.1	8,333	5.6	320	0.1
Flooding/wet	324	78.6	105,221	70.1	8,493	5.7
Frost	8	1.9	2,425	1.6	295	0.2
Hail	11	2.7	4,553	3.0	395	0.3
Wind/sandblast	6	1.5	991	0.7	213	0.1
Heat stress	17	4.1	7,723	5.1	0	0
None	13	3.2	4,354	2.9	—	—
Northarvest						
Drought/dry	22	3.6	8,896	4.3	400	0.2
Flooding/wet	457	75.2	146,113	71.0	12,450	6.0
Frost	9	1.5	2,825	1.4	455	0.2
Hail	15	2.5	5,273	2.6	395	0.2
Wind/sandblast	12	2.0	2,004	1.0	220	0.2
Heat stress	37	6.1	10,793	5.2	27	tr
None	22	3.6	5,966	2.9	—	—

^a Respondents' acres only.

^b tr = trace

Production Problems

The worst production problems for Northarvest survey respondents were diseases, followed by weeds and harvesting problems (Table 12). Diseases were reported to be the worst production problem by 32% of survey respondents representing 38% of the acres reported. Weeds were reported to be the worst production problem by 19% of survey respondents representing 16% of the acres reported, and harvesting problems were reported to be

the worst production problem by 9% of survey respondents representing 12% of the acres reported. These data are similar to 1994 (6).

Diseases were reported as the worst production problem in Minnesota by 29% of that state's respondents representing 35% of respondents' acres. Weeds were reported as the worst production problem in Minnesota by 19% of that state's respondents representing 17% of respondents acres. Harvesting problems were reported

Table 10. Weather damage reported by respondents in 1995 in each Northarvest district of Minnesota and North Dakota.

Northarvest District	Area Damaged ^a				Area Lost ^a			
	- Flooding/Wet -		- Heat Stress -		- Flooding/Wet -		- Heat Stress -	
	Acres	%	Acres	%	Acres	%	Acres	%
Minnesota								
MN1	24,795	90.9	71	1.4	2,744	10.2	0	0
MN2	635	12.3	1,170	22.7	16	0.3	23	0.4
MN3	6,759	83.6	128	1.6	0	8.7	4	tr ^b
MN4	2,877	47.5	638	10.5	12	3.2	0	0
MN5	5,826	63.4	763	8.3	276	3.0	0	0
MN Total	40,892	73.3	3,070	5.5	3,748	6.7	27	tr ^b
North Dakota								
ND1	24,374	52.5	2,962	6.4	1,964	4.2	0	0
ND2	25,259	91.6	0	0	3,068	11.1	0	0
ND3	18,289	59.4	4,761	15.5	872	2.8	0	0
ND4	18,291	78.1	0	0	834	3.6	0	0
ND5	19,008	87.0	0	0	1,755	8.0	0	0
ND Total	105,221	70.1	7,723	5.1	8,493	5.7	0	0

^a Respondents' acres only.

^b tr = trace.

Table 11. Acres harvested in 1995 by respondents in each Northarvest district in Minnesota and North Dakota.

Northarvest District	Acres Harvested	% of District Acres
Minnesota		
MN1	4,299	89.1
MN2	5,034	97.5
MN3	7,061	87.3
MN4	8,858	96.4
MN Total	50,646	90.8
North Dakota		
ND1	43,792	94.3
ND2	23,166	84.0
ND3	29,500	95.9
ND4	22,009	94.0
ND5	19,465	89.1
ND Total	137,932	91.9
Northarvest Total	188,578	91.6

as the worst production problem in Minnesota by 10% of that state's respondents representing 17% of respondents' acres (Table 12).

Diseases were reported as the worst production problem in North Dakota by 33% of that state's respondents representing 39% of their acres. Weeds were reported as the worst production problem by 19% of that state's respondents representing 15% of their acres. Harvesting problems were reported as the worst production problem by 9% of that state's respondents representing 10% of their acres (Table 12).

Diseases, the worst production problem for Minnesota respondents, were especially severe in MN1 and MN4 with 51% and 38% of respondents' acres affected, respectively.

Table 12. Worst production problem in 1995 for respondents in Minnesota and North Dakota.

Worst Production Problem	- Respondents -		- Acres Reported ^a -	
	Number	%	Number	%
Minnesota				
Diseases	65	29.4	19,514	35.0
Weeds	42	19.0	9,599	17.2
Harvesting	22	10.0	9,326	16.7
Delayed planting	8	3.6	1,594	2.9
Emergence/stand	7	3.2	906	1.6
Drift injury	1	0.5	440	0.8
Herbicide injury	4	1.8	294	0.5
Other	30	13.6	4,472	8.0
None	18	8.1	4,133	7.4
North Dakota				
Diseases	150	32.7	59,124	39.4
Weeds	88	19.2	22,934	15.3
Harvesting	41	8.9	15,468	10.3
Delayed planting	34	7.4	9,776	6.5
Emergence/stand	14	3.1	4,705	3.1
Micronutrient deficiency	3	0.7	1,041	0.7
Herbicide injury	3	0.7	877	0.6
Other	18	3.9	2,978	2.0
None	45	9.8	13,229	8.8
Northarvest Total				
Diseases	215	31.6	78,638	38.2
Weeds	130	19.1	32,533	15.8
Harvesting	63	9.3	24,794	12.0
Delayed planting	42	6.2	11,370	5.5
Emergence/stand	21	3.1	5,611	2.7
Herbicide injury	7	1.0	1,171	0.6
Micronutrient deficiency	3	0.4	1,041	0.5
Drift injury	1	0.1	440	0.2
Other	48	7.1	7,450	3.6
None	63	9.3	17,362	8.4

^a Respondents' acres only

Weeds, the second worst production problem for Minnesota respondents, were worst in MN5 with 37% of respondents' acres affected. Harvesting problems, the third worst production problem for Minnesota respondents, affected 39% of MN3 and 22% of MN5 respondents' acres (Table 13).

Diseases, the worst production problem for North Dakota respondents, were especially severe in ND4, ND1, ND5 and ND2 with 53%, 46%, 37% and 33% of respondents' acres affected, respectively. Weeds, the second worst production problem for North Dakota respondents, were worst in ND4, ND3 and ND5 with 23%, 22% and 20% of respondents' acres affected, respectively. Harvest problems, the third worst production problem for North Dakota respondents, affected 24% of ND2 respondents' acres. Respondents in ND2 and ND3 reported delayed planting a major production problem on 14% of their acres in each of these two districts (Table 13).

Disease Problems

White mold was the worst disease problem for 61% of Northarvest survey respondents representing 67% of their dry bean acres, followed by rust for 7% of respondents representing 7% of their acres. White mold was the worst disease problem on 61% of Minnesota and 70% of North Dakota respondents' acres. These figures are up from 1994 when white mold was the worst disease problem on 42% of Minnesota and 52% of North Dakota respondents' acres. Rust was the worst disease problem on 4% of Minnesota and 8% of North Dakota respondents' acres. This is down from 1994. Bacterial blight and root rot were not listed as frequent problems in 1995 (Table 14).

White mold was ranked as one of the three worst disease problems by Northarvest survey respondents on 78% of dry bean acres reported, a number similar to that reported in 1994. Rust was ranked as one of the three worst disease problems on 46% of respondents' acres, down from 1994. Bacterial blight was reported as one of the three worst disease problems on 18% of dry bean acres reported, down slightly from 1994 (Table 15).

White mold was cited as one of the three worst disease problems slightly more frequently in North Dakota than in Minnesota (80% of respondents' acres compared to 72% in Minnesota). Rust was also cited more frequently in North Dakota than in Minnesota (50% of respondents' acres compared to 36% in Minnesota). Bacterial blight was cited slightly more frequently in North Dakota than in Minnesota (20% of respondents' acres in North Dakota and 14% in Minnesota) and root rot was cited more frequently

Table 13. Worst production problems for respondents by district in 1995, Minnesota and North Dakota.

Northharvest District	Acres Affected ^a				% Acres Affected ^a			
	Disease	Weeds	Harvesting	Delayed Planting	Disease	Weeds	Harvesting	Delayed Planting
Minnesota								
MN1	13,812	3,827	3,257	1,320	50.7	14.0	11.9	4.8
MN2	1,035	576	700	0	20.0	11.2	13.6	0
MN3	1,530	1,352	3,145	134	18.9	16.7	38.9	1.7
MN4	2,304	405	217	140	38.1	6.7	3.6	2.3
MN5	833	3,439	2,007	0	9.1	37.4	21.8	0
MN Total	19,514	9,599	9,326	1,594	35.0	17.2	16.7	2.9
North Dakota								
ND1	21,185	4,959	6,890	600	45.6	10.7	14.8	1.3
ND2	9,149	1,612	6,470	3,847	33.2	5.8	23.5	13.9
ND3	8,123	6,653	375	4,373	26.4	21.6	1.2	14.2
ND4	12,493	5,425	1,333	218	53.4	23.2	5.7	0.9
ND5	8,174	4,285	400	738	37.4	19.6	1.8	3.4
ND Total	59,124	22,934	15,468	9,776	39.4	15.3	10.3	6.5
Northharvest Total								
	78,638	32,533	24,794	11,370	38.2	15.8	12.00	5.5

^a Respondents' acres only.

Table 14. Worst disease problem^a in 1995 for respondents in Minnesota and North Dakota.

Worst Disease Problem	- Respondents -		- Acres Reported ^b -	
	Number	%	Number	%
Minnesota				
White mold	125	56.6	33,896	60.8
Root rot	9	4.1	2,717	4.9
Rust	9	4.1	2,324	4.2
Bacterial blight	9	4.1	2,194	3.9
None	22	10.0	4,206	7.5
North Dakota				
White mold	289	63.0	104,680	69.8
Rust	41	8.9	11,358	7.6
Bacterial blight	7	1.5	2,533	1.7
Root rot	11	2.4	4,726	3.2
None	35	7.6	7,902	5.3
Northharvest Total				
White mold	414	60.9	138,576	67.3
Rust	50	7.4	13,682	6.6
Bacterial blight	7	1.5	2,533	1.7
Root rot	29	2.9	6,920	3.4
None	57	8.4	12,108	5.9

^a Ranked as No.1 disease problem by respondents.

^b Respondents' acres only.

Table 15. Diseases ranked as one of the three worst^a in 1995 by respondents in Minnesota and North Dakota.

No. 1, 2 or 3 Disease Problem	- Respondents -		- Acres Reported ^b -	
	Number	%	Number	%
Minnesota				
White mold	144	65.2	40,048	71.8
Rust	51	23.1	19,877	35.6
Root rot	36	16.3	9,616	17.2
Bacterial blight	31	14.0	7,661	13.7
Alternaria	2	0.9	363	0.7
None				
North Dakota				
White mold	332	72.3	120,109	80.1
Rust	187	40.7	74,210	49.5
Bacterial blight	83	18.1	29,791	19.9
Root rot	40	8.7	13,589	9.1
Alternaria	7	1.5	2,500	1.7
None	35	7.6	7,902	5.3
Northharvest Total				
White mold	476	70.7	160,157	77.8
Rust	238	35.0	94,097	45.7
Bacterial blight	114	16.8	37,452	18.2
Root Rot	76	11.2	23,205	11.3
Alternaria	9	1.3	2,863	1.4
None	57	8.4	12,108	5.9

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

^b Respondents' acres only.

in Minnesota than North Dakota (17% of respondents' acres in Minnesota and 9% in North Dakota; see Table 15).

White mold was ranked as the worst disease problem in all Minnesota and North Dakota districts (Table 16). All but two of the districts ranked white mold as the worst disease problem on over half of the acres reported, and half of the districts ranked it as the worst disease problem on 70-80% of respondents' acres. Root rot was ranked as the worst disease on 23% of acres reported in MN5 and rust was ranked as the worst disease on 14% of acres reported in ND1. These are the only disease problems, other than white mold, that were reported as a worst disease problem on over 10% of acres in any district.

Not only was white mold ranked as the worst disease problem in all Minnesota and North Dakota districts, but it was also highest among those ranked as one of the three worst diseases. Rust was ranked next highest in MN1, MN2 and all five ND districts. Root rot was ranked next after white mold in the other three MN districts. Rust was ranked as one of the three worst diseases on as high as 60% of MN1 and 54% of ND1 respondents' acres. Root rot was ranked as one of the three worst diseases on as high as 34% of MN4 and 28% of MN5 respondents' acres (Table 17).

Table 16. Worst disease problem^a in 1995 in each Northharvest district for respondents in Minnesota and North Dakota.

North-arvest District	Worst Disease Problem	- Respondents -		- Acres Reported ^b -	
		Number	%	Number	%
Minnesota					
MN1	White mold	43	66.2	19,238	70.6
	Rust	3	4.6	1,625	6.0
MN2	White mold	8	47.1	2,355	45.6
MN3	White mold	20	45.5	4,691	58.0
	Rust	4	9.1	506	6.3
	Root rot	3	6.8	432	5.3
MN4	White mold	36	67.9	4,488	74.1
	Bacterial blight	7	13.2	782	12.9
MN5	White mold	18	42.9	3,124	34.0
	Root rot	3	7.1	2,095	22.8
North Dakota					
ND1	White mold	94	66.2	33,463	72.1
	Rust	22	15.5	6,423	13.8
ND2	White mold	52	65.0	16,447	59.6
	Rust	6	7.5	2,117	7.7
	Bacterial blight	3	3.8	1,660	6.0
ND3	White mold	47	53.4	19,166	62.3
ND4	White mold	47	71.2	19,012	81.2
ND5	White mold	49	59.0	16,592	76.0
	Rust	4	4.8	1,160	5.3

^a Diseases reported on more than 5% of respondents' acres.

^b District respondents' acres only.

Disease Control Practices

Fungicides were used on 42% of Northharvest survey respondents' acres, down from 56% in 1994. These use-age figures are still far above the figures for 1992, when fungicides were used on only 14% of respondents' acres. Fungicides were used on 38% of Minnesota respondents' acres and 43% of North Dakota respondents' acres (Table 18). This represents a major drop in fungicide use in Minnesota and a somewhat less dramatic drop in North Dakota. The greatest use of fungicide in Minnesota was

Table 17. Diseases ranked as one of three^a worst in 1995 in each Northharvest district in Minnesota and North Dakota.

North-arvest District	No. 1, 2 or 3 Disease Problem	- Respondents -		- Acres Reported ^b -	
		Number	%	Number	%
Minnesota					
MN1	White mold	31	72.3	21,468	78.7
	Rust	47	47.7	16,284	59.7
	Bacterial blight	9	13.8	3,866	14.2
MN2	White mold	8	47.1	2,355	45.6
	Rust	3	17.6	723	14.0
	Bacterial blight	2	11.8	655	12.7
MN3	White mold	27	61.4	5,379	66.5
	Root rot	7	15.9	817	10.1
	White mold	39	73.6	5,240	86.6
MN4	Root rot	16	30.2	2,036	33.6
	Bacterial blight	10	18.9	1,758	29.0
	White mold	23	54.8	5,606	61.0
MN5	Root rot	5	11.9	2,580	28.1
	Rust	9	21.4	1,799	19.6
	Bacterial blight	6	14.3	1,102	12.0
North Dakota					
ND1	White mold	110	77.5	39,730	85.6
	Rust	67	47.2	25,011	53.9
	Bacterial blight	32	22.5	11,871	25.6
ND2	White mold	62	77.5	21,524	78.0
	Rust	34	42.5	12,768	46.3
	Bacterial blight	14	17.5	4,774	17.3
ND3	Root rot	4	5.0	2,852	10.3
	White mold	55	62.5	21,141	68.7
	Rust	34	38.6	14,809	48.1
ND4	Bacterial blight	16	18.2	4,874	15.8
	White mold	50	75.8	19,390	82.8
	Rust	28	42.4	11,420	48.8
ND5	Bacterial blight	8	12.1	3,700	15.8
	Root rot	8	12.1	3,151	13.5
	White mold	55	66.3	18,324	83.9
ND5	Rust	24	28.9	10,202	46.7
	Bacterial blight	13	15.7	4,572	20.9
	Root rot	14	16.9	2,607	11.9

^a Diseases reported on more than 10% of respondents' acres; those reporting no problem are not included.

^b District respondents'.

Topsin M (11% of respondents' acres) and Benlate (10% of respondents' acres; see Table 19). The greatest use of fungicide in North Dakota was Tilt (13% of respondents acres; see Table 18).

In Minnesota 21% of respondents' acres were sprayed with the benzimidazole fungicides Benlate and Topsin M for white mold control, compared to 18% of respondents' acres in North Dakota. In Minnesota, 5% of respondents' acres received a band application (directed spray) of a benzimidazole fungicide, compared to 10% of North Dakota respondents' acres (Table 19). The acres that were band sprayed represented 26% of Minnesota respondents' acres and 55% of North Dakota respondents' acres that were sprayed for white mold. The figures for band sprays are lower than for 1994, especially for Minnesota. However, since the weather was extremely wet, many growers may not have been able to use a band application which required field entry.

Rust fungicides were used on 17% of respondents' acres in Minnesota, 25% in North Dakota and 23% of all Northharvest respondents' acres (Table 20). Tilt, available for use in both states under a specific exemption (Section 18), was used on 11% of respondents' acres, followed by Bravo on 7% and maneb on 5%. In Minnesota, Bravo was used on 7% of respondents' acres, Tilt on 6% and maneb on 4% of respondents' acres. In North Dakota, Tilt was used on 13% of respondents' acres, Bravo on 7% and maneb on 5% of respondents' acres. The higher usage of rust fungicides (primarily Tilt) in North Dakota is not surprising since a much higher percentage of the North Dakota crop was planted to pinto beans, and all of the commonly grown varieties are susceptible to the races of rust present in 1995.

Use of rust fungicides was highest in ND1, MN1 and ND2 with 48%, 35% and 27% of respondents' acres treated (Table 21).

Table 18. Fungicide use in 1995 by respondents in Minnesota and North Dakota.

Fungicide	Method of Application ^a	- Respondents -		- Acres Treated ^b -	
		Number	%	Number	%
Minnesota					
Benlate	Banded	4	6.3	1,812	3.2
Benlate	Broadcast	17	7.7	3,574	6.4
Bravo	—	12	5.4	3,692	6.6
Maneb	—	7	3.2	2,429	4.4
Tilt	—	10	4.5	3,515	6.3
Topsin	Banded	5	2.3	1,207	2.2
Topsin	Broadcast	27	12.2	5,021	9.0
MN Total		92	41.6	21,250	38.1
North Dakota					
Benlate	Banded	30	6.5	7,962	5.3
Benlate	Broadcast	33	7.2	6,265	4.2
Bravo	—	45	9.8	10,486	7.0
Maneb	—	37	8.1	7,991	5.3
Tilt	—	68	14.8	19,324	12.9
Topsin	Banded	23	5.0	6,477	4.3
Topsin	Broadcast	26	5.7	5,678	3.8
ND Total		262	57.1	64,183	42.8
Northharvest Total					
Benlate	Banded	44	6.5	9,774	4.7
Benlate	Broadcast	50	7.4	9,839	4.8
Bravo	—	57	8.4	14,178	6.9
Maneb	—	44	6.5	10,420	5.1
Tilt	—	78	11.5	22,838	11.1
Topsin	Banded	28	4.1	7,684	3.7
Topsin	Broadcast	53	7.8	10,699	5.2
Northharvest Total		354	52.1	85,432	41.5

Table 19. Use of fungicides for white mold control in 1995 by respondents in Minnesota and North Dakota.

Fungicide	Band Applied		Broadcast		Total	
	Acres	%	Acres	%	Acres	%
Minnesota						
Benlate	1,812	3.2	3,574	6.4	5,386	9.7
Topsin M	1,207	2.2	5,021	9.0	6,228	11.2
Total ^a	3,019	5.4	8,595	15.4	11,614	20.8
North Dakota						
Benlate	7,962	5.3	6,265	4.2	14,227	9.5
Topsin M	6,477	4.3	5,678	3.8	12,155	8.1
Total ^a	14,439	9.6	11,943	8.0	26,382	17.6
Northharvest Total						
Benlate	9,774	4.7	9,839	4.8	19,613	9.5
Topsin	7,684	3.7	10,699	5.2	18,383	8.9
Total ^a	17,458	8.5	20,538	10.0	37,996	18.5

^a Total of Benlate + Topsin M.

Table 20. Use of fungicides for rust control in 1995 in Minnesota and North Dakota.

	Bravo		Maneb		Tilt		Total ^a	
	Acres	%	Acres	%	Acres	%	Acres	%
Minn.	3,692	6.6	2,429	4.4	3,515	6.3	9,636	17.3
N.D.	10,486	7.0	7,991	5.3	19,323	12.9	37,800	25.2
North.								
Total	14,178	6.9	10,420	5.1	22,838	11.1	47,436	23.1

^a Total of Bravo + Maneb + Tilt.

^a Respondents were not asked method of application for Bravo, Maneb or Tilt.

^b Respondents' acres only.

Use of white mold fungicides was very high in MN2, where 60% of respondents' acres were treated: 1% of their acres were banded with Benlate, 27% were broadcast with Benlate, 17% were banded with Topsin M and 15% were broadcast with Topsin M (Table 21). Use was also high in MN4 and MN5 where 28% and 31% of respondents' acres were treated, respectively: in MN4 11% of respondents' acres were banded with Benlate, 7% were broadcast with Benlate, 4% were banded with Topsin M and 6% were broadcast with Topsin M. In MN5 5% were banded with Benlate, 10% were broadcast with Benlate, 1% were banded with Topsin M and 15% were broadcast with Topsin M.

Use of white mold fungicides was highest in ND1, where 31% of respondents' acres were treated: 14% of the acres

were banded with Benlate, 7% were broadcast with Benlate, 4% were banded with Topsin M and 6% were broadcast with Topsin M (Table 21). No more than 15% of respondents' acres were treated for white mold in any other North Dakota district.

Weed Problems

Wild mustard was the worst weed problem for 33% of Northharvest survey respondents representing 33% of the acres reported (Table 22). This is about half again as high a percentage as was reported in 1994, but is similar to the figures reported in 1992 when it was the worst weed problem for 37% of respondents representing 40% of the acres

Table 21. Use of fungicides in 1995 in each Northharvest district in Minnesota and North Dakota.

Northharvest District	Benlate Banded	Benlate Broadcast	Bravo	Maneb	Tilt	Topsin M Banded	Topsin M Broadcast
----- % Respondents' Acres Treated -----							
Minnesota							
MN1	2.4	2.9	13.5	8.8	12.6	0	8.0
MN2	1.1	26.8	0	0	0	16.5	15.1
MN3	0	0	0	0	0	0	4.0
MN4	11.0	7.2	0	0	0	4.2	5.9
MN5	4.8	10.4	0	0.4	0.9	1.1	15.1
North Dakota							
ND1	13.6	7.3	17.5	10.0	20.5	4.2	5.6
ND2	2.3	2.1	4.3	9.1	13.1	5.8	5.2
ND3	0.4	4.0	1.2	0.1	11.0	0.2	0
ND4	2.1	2.0	3.1	2.6	8.4	4.5	5.5
ND5	1.8	2.8	0.3	0.9	3.9	8.2	1.6

Table 22. Worst weed problem^a in 1995 for all Northharvest respondents in Minnesota and North Dakota.

Worst Weed Problem	Respondents		Acres Reported ^b	
	Number	%	Number	%
Wild mustard	149	32.5	66,912	32.5
E. black nightshade	47	10.2	24,694	12.0
Foxtail	54	11.8	22,313	10.8
Redroot pigweed	49	10.7	22,273	10.8
Canada thistle	51	11.1	17,615	8.6
Cocklebur	26	5.7	10,934	5.3
Ragweed	11	2.4	9,652	4.7
Kochia	17	3.7	5,818	2.8
Lambsquarters	7	1.5	4,643	2.3
Volunteer grain	7	1.5	4,002	1.9
Wild oat	10	2.2	2,963	1.4
Other	6	1.3	3,294	1.6
None	9	2.0	3,927	1.9

^a Ranked as No. 1 weed problem on more than 0.5% of respondents' acres.

^b Respondents' acres only.

reported (3). Cool, moist conditions after planting caused multiple wild mustard flushes, contributing to it being the worst weed problem.

Eastern black nightshade was the worst weed for 10% of respondents representing 12% of the acres reported. The number of respondents reporting eastern black nightshade as the worst weed problem has steadily increased from 6% in 1987 to 13% in 1994. Several reasons can explain the increase in eastern black nightshade infestation. Some reasons are prolonged germination, four successive years of wet spring and early summer conditions, lack of effective, residual herbicides without risk of carryover, shade tolerance, and dissemination through contaminated crop seed.

Foxtail was the worst weed for 12% of respondents representing 11% of the acres reported, redroot pigweed was the worst weed for 11% of respondents representing 11% of the acres reported, Canada thistle was the worst weed for 11% of respondents representing 9% of the acres reported, and common cocklebur was the worst weed for 6% of respondents representing 5% of the acres reported. Other commonly reported weed problems included ragweed, kochia, common lambsquarters, volunteer grain and wild oats.

In Minnesota, redroot pigweed was the worst weed problem for 15% of survey respondents representing 21% of the Minnesota acres reported (Table 23). This is about twice as high a percentage of acres as in 1994. Wild mustard was the worst weed for 12% of respondents representing 17% of the acres reported, eastern black nightshade was the worst weed for 13% of respondents representing 14% of the acres reported, ragweed was the worst weed for 12% of respondents representing 12% of the acres reported, foxtail was the worst weed for 10% of respondents representing 11% of the acres reported, lambsquarters was the worst weed for 9% of respondents representing 6% of the acres reported, cocklebur was the worst weed for 8% of respondents representing 4% of the acres reported, and Canada thistle was the worst weed for 6% of respondents representing 4% of the acres reported. Kochia was also a commonly reported weed problem.

In North Dakota, wild mustard was the worst weed for 33% of respondents representing 38% of the North Dakota acres reported (Table 23). This is half again as high a percentage of acres as in 1994 but less than the 46% of North Dakota respondents' acres reported in 1992 (3). Eastern black nightshade was the worst weed for 10% of respondents representing 11% of the acres reported, foxtail was the worst weed for 12% of respondents representing 11% of the acres reported, Canada thistle was the worst weed for 11% of respondents representing 10% of the acres

reported, redroot pigweed was the worst weed for 11% of respondents representing 7% of the acres reported, cocklebur was the worst weed for 6% of respondents representing 6% of the acres reported and kochia was the worst weed for 4% of respondents representing 4% of the acres reported. Other commonly reported weed problems included volunteer grain, wild oats, ragweed and lambsquarters.

Wild mustard was reported as the worst weed problem, based on percent of respondents' acres affected, in MN2, ND1, ND2, ND3 and ND4 with 32%, 36%, 57%, 39% and 50% of acres affected (Table 24). Eastern black nightshade was reported as the worst weed in MN3 and ND5, with 46% and 43% of acres affected. Redroot pigweed was reported as the worst weed in MN1, with 32% of acres affected; cocklebur was reported as the worst weed in MN4, with 20% of acres affected; and foxtail was reported as the worst weed in MN5, with 23% of acres affected. Most of these results are similar to those for 1994.

Table 23. Worst weed problem^a in 1995 for respondents in Minnesota and North Dakota.

Worst Weed Problem	- Respondents -		- Acres Reported ^b -	
	Number	%	Number	%
Minnesota				
Redroot pigweed	32	14.5	11,459	20.5
Wild mustard	27	12.3	9,677	17.4
E. black nightshade	29	13.1	7,949	14.3
Ragweed	27	12.2	6,710	12.0
Foxtail	22	10.0	6,266	11.2
Lambsquarters	19	8.6	3,311	5.9
Cocklebur	17	7.7	2,402	4.3
Canada thistle	13	5.9	2,078	3.7
Kochia	3	1.4	533	1.0
Other	11	5.0	1,643	2.9
None	5	2.3	382	0.7
North Dakota				
Wild mustard	149	32.5	57,235	38.2
E. black nightshade	47	10.2	16,745	11.2
Foxtail	54	11.8	16,047	10.7
Canada thistle	51	11.1	15,537	10.4
Redroot pigweed	49	10.7	10,814	7.2
Cocklebur	26	5.7	8,532	5.7
Kochia	17	3.7	5,285	3.5
Volunteer grain	7	1.5	3,712	2.5
Wild oat	10	2.2	2,963	2.0
Ragweed	11	2.4	2,942	2.0
Lambsquarters	7	1.5	1,332	0.9
Other	6	1.3	1,651	1.1
None	9	2.0	3,545	2.4

^a Ranked as No. 1 weed problem on more than 0.5% of respondents' acres for that state.

^b Respondents' acres only.

Wild mustard was ranked most frequently as one of the three worst weeds in Minnesota, with 39% of respondents' acres reported, followed by redroot pigweed on 36%, lambsquarters on 33%, foxtail on 26%, eastern black nightshade on 25% and Canada thistle on 20% (Table 25). In North Dakota, wild mustard was reported as one of the three worst weeds on 66% of respondents' acres, followed by Canada thistle on 33%, foxtail on 30%, cocklebur on 21%, and eastern black nightshade on 21%. Weeds ranked as one of the three worst weeds by all respondents in both states were mild mustard on 59% of respondents' acres,

followed by Canada thistle on 30%, foxtail on 29%, redroot pigweed on 23%, eastern black nightshade on 22% and cocklebur on 20%.

Wild mustard was ranked most frequently as one of the three worst weeds in MN1, ND1, ND2, ND3 and ND4. Eastern black nightshade was ranked most frequently as one of the three worst weeds in MN3 and ND5; lambsquarters was most frequently ranked as one of the three worst in MN2 and MN4; and foxtail was most frequently ranked as one of the three worst in MN4 (Table 26).

Table 24. Worst weed problem^a in 1995 for respondents in each Northharvest district of Minnesota and North Dakota.

Northharvest District	Worst Weed Problem	- Respondents -		- Acres Reported ^b -	
		Number	%	Number	%
Minnesota					
MN1	Redroot pigweed	17	26.2	8,589	31.5
	Wild mustard	20	30.8	7,106	26.1
	Foxtail	7	10.8	2,925	10.7
MN2	Wild mustard	3	17.6	1,638	31.7
	E. black nightshade	4	23.5	1,553	30.1
	Ragweed	4	23.5	1,150	22.3
MN3	E. black nightshade	8	18.2	3,733	46.1
	Ragweed	9	20.5	1,897	23.5
MN4	Cocklebur	9	17.0	1,234	20.4
	Lambsquarters	9	17.0	1,012	16.7
	Foxtail	7	13.2	977	16.1
	Redroot pigweed	6	11.3	954	15.8
	E. black nightshade	8	15.1	855	14.1
MN5	Foxtail	3	7.1	2,103	22.9
	Redroot pigweed	6	14.3	1,527	16.6
	Ragweed	6	14.3	1,178	12.8
	E. black nightshade	6	14.3	1,142	12.4
North Dakota					
ND1	Wild mustard	54	38.0	16,804	36.2
	Canada thistle	27	19.0	8,073	17.4
	Redroot pigweed	18	12.7	5,498	11.8
ND2	Wild mustard	37	46.3	15,634	56.7
	Canada thistle	10	12.5	3,194	11.6
ND3	Wild mustard	29	33.0	11,958	38.9
	Cocklebur	12	13.6	5,639	18.3
ND4	Wild mustard	25	37.9	11,791	50.4
	Foxtail	11	16.7	3,828	16.3
	E. black nightshade	9	13.6	2,992	12.8
ND5	E. black nightshade	24	28.9	9,295	42.6
	Foxtail	11	13.3	2,708	12.4
	Cocklebur	10	12.0	2,470	11.3

^a Ranked as the No. 1 weed problem on more than 10% of respondents' acres for that district.

^b District respondents' acres only.

Table 25. Weeds ranked as one of the three worst^a in 1995 by respondents in Minnesota and North Dakota.

No. 1, 2 or 3 Weed Problem	- Respondents -		- Acres Reported ^b -	
	Number	%	Number	%
Minnesota				
Wild mustard	60	27.1	21,902	39.3
Redroot pigweed	70	31.7	19,934	35.7
Lambsquarters	71	32.1	18,193	32.6
Foxtail	57	25.8	14,524	26.0
E. black nightshade	58	26.2	13,883	24.9
Canada thistle	38	17.2	11,274	20.2
Ragweed	56	25.3	11,102	19.9
Cocklebur	41	18.6	9,667	17.3
North Dakota				
Wild mustard	279	60.8	98,432	65.6
Canada thistle	166	36.2	49,433	32.9
Foxtail	136	29.6	44,402	29.6
Cocklebur	79	17.2	30,862	20.6
E. black nightshade	93	20.3	30,774	20.5
Kochia	71	15.5	26,891	17.9
Redroot pigweed	98	21.4	26,677	17.8
Northharvest Total				
Wild mustard	339	49.9	120,334	58.5
Canada thistle	204	30.0	60,707	29.5
Foxtail	193	28.4	58,926	28.6
Redroot pigweed	168	24.7	46,611	22.7
E. black nightshade	151	22.2	44,657	21.7
Cocklebur	120	17.6	30,862	19.7
Lambsquarters	107	15.7	28,904	14.0
Ragweed	91	13.4	22,539	11.0

^a Ranked as No. 1, 2, or 3 weed problem on more than 10% of respondents' acres.

^b Respondents' acres only.

Table 26. Weeds ranked as one of the three worst^a in 1995 in each Northarvest district in Minnesota and North Dakota.

Northarvest District	No.1, 2, or 3 Weed Problem	- Respondents -		- Acres Reported ^b -		
		Number	%	Number	%	
Minnesota						
MN1	Wild mustard	41	63.1	16,679	61.2	
	Redroot pigweed	31	47.7	13,267	48.7	
	Foxtail	18	27.7	7,635	28.0	
	Lambsquarters	13	20.0	7,137	26.2	
	Canada thistle	5	23.1	5,808	21.3	
MN2	Lambsquarters	7	41.2	2,760	53.4	
	Ragweed	9	52.9	2,118	41.0	
	E. black nightshade	6	35.3	1,846	35.7	
	Wild mustard	3	17.6	1,638	31.7	
MN3	E. black nightshade	16	36.4	5,504	68.0	
	Cocklebur	11	25.0	3,730	46.1	
	Canada thistle	8	18.2	3,359	41.5	
	Lambsquarters	13	29.5	2,350	29.1	
	Ragweed	12	27.3	2,056	25.4	
MN4	Lambsquarters	27	50.9	3,181	52.6	
	Redroot pigweed	15	28.3	2,596	42.9	
	Foxtail	18	34.0	2,046	33.8	
	E. black nightshade	16	30.2	2,024	33.4	
	Cocklebur	18	34.0	1,936	32.0	
MN5	Ragweed	15	28.3	1,445	23.9	
	Foxtail	8	19.0	3,578	38.9	
	E. black nightshade	15	35.7	3,443	37.5	
	Wild mustard	11	26.2	2,948	32.1	
	Redroot pigweed	13	31.0	2,863	31.1	
North Dakota	Ragweed	14	33.3	2,782	30.3	
	Lambsquarters	11	26.2	2,765	30.1	
	Volunteer grain	6	14.3	2,059	22.4	
	ND1	Wild mustard	89	62.7	29,927	64.5
		Canada thistle	75	52.8	22,116	47.6
Redroot pigweed		37	26.1	12,623	27.2	
Wild oat		35	24.6	12,137	26.1	
Foxtail		29	20.4	10,894	23.5	
ND2	Kochia	32	22.5	10,565	22.8	
	Wild mustard	58	72.5	22,147	80.3	
	Canada thistle	30	37.5	9,949	36.1	
	Foxtail	22	27.5	6,493	23.5	
ND3	Wild mustard	60	68.2	20,687	67.2	
	Canada thistle	28	31.8	9,348	30.4	
	Foxtail	28	31.8	9,329	30.3	
ND4	Wild mustard	44	66.7	17,213	73.5	
	Foxtail	34	51.5	11,553	49.3	
	E. black nightshade	18	27.3	6,780	29.0	
	Kochia	11	16.7	5,601	23.9	
ND5	E. black nightshade	46	55.4	14,178	64.9	
	Cocklebur	25	30.1	10,620	48.6	
	Wild mustard	28	33.7	8,458	38.7	
	Foxtail	23	27.7	6,133	28.1	

^a Ranked as No. 1, 2, or 3 on more than 20% of respondents' acres for that district.

^b District respondents' acres only.

Weed Control Practices

The most common chemical weed control practice was spring pre-plant incorporation of Sonalan, used on 67% of respondents' acres (Table 27). This is similar to 1994. Other common chemical weed control practices included post-application of bentazon (Basagran, others) on 56% of respondents' acres, post-application of Poast on 19%, spring pre-plant incorporation of trifluralin on 18%, and post-application of Pursuit on 12%. The use of bentazon doubled from 1994 to 1995.

The most common cultural weed control practice was row cultivation, used by 85% of Northarvest respondents on 88% of their acres (Table 27). Cultivation was used on 81% of Minnesota respondents' acres and 90% of North Dakota respondents' acres. Respondents indicated they used an average of 1.9 cultivations (Table 28). Over 27% of respondents used only one cultivation, nearly 60% used two cultivations, and over 14% used three or more cultivations (Table 29). The number of cultivations was similar for Minnesota and North Dakota. There were differences, however, among districts, with the percentage of single cultivations highest in MN3, MN5, ND3 and ND5. The percentage of three or more cultivations was highest in MN2 and ND1.

Table 27. Weed control practices^a in 1995 by all Northarvest respondents in Minnesota and North Dakota.

Weed Control Practice	- Respondents -		- Acres Treated ^b -	
	Number	%	Number	%
Cultivation	581	85.4	180,302	87.6
Sonalan, spring applied	449	66.0	137,394	66.8
Bentazon (Basagran, others)	438	64.4	115,294	56.0
Rotary hoe	154	22.6	49,668	24.1
Poast	249	36.6	39,781	19.3
Trifluralin, spring applied	155	22.8	37,006	18.0
Pursuit	123	18.1	24,749	12.0
Eptam, spring applied	54	7.9	16,288	7.9
Gramoxone Extra	94	13.8	15,278	7.4
Alachlor (Lasso, others)	48	7.1	11,029	5.4
Roundup, Preplant	91	13.4	9,392	4.6
Sonalan, fall applied	27	4.0	5,978	2.9
Trifluralin, fall applied	19	2.8	4,538	2.2
Dual	24	3.5	4,302	2.1
Prowl	19	2.8	2,807	1.4
Trifluralin + Eptam	13	1.9	2,631	1.3

^a Includes all practices or herbicides used on more than 1,000 acres.

^b Respondents' acres only.

The rotary hoe was used by 23% of respondents on 24% of their acres, which is similar to 1994 and 1992 (3, 6). Respondents indicated they used an average of 1.4 rotary hoe cultivations (Table 30).

Desiccants were used more frequently in 1995 than in 1994. Gramoxone was used by 13.8% of Northharvest respondents on 7.4% of respondents' acres in 1995. Sodium chlorate was used by 8.5% of respondents on 4.2% of their acres (Table 27). The percent of acres treated by each desiccant is approximately twice those treated in 1994. Gramoxone was used to treat 13.2% of Minnesota

Table 28. Dry bean acres cultivated in 1995 by Northharvest respondents in Minnesota and North Dakota.

	Respondents Cultivating		Acres Cultivated		Total Cultivation	
	Number	%	Number ^a	%	Acres ^b	Average Number ^c
Minn.	176	79.6	44,986	80.7	89,851	2.0
N.D.	405	88.2	135,316	90.2	251,985	1.9
North.						
Total	581	85.4	180,302	87.6	341,836	1.9

^aNumber of acres cultivated.

^bAcres cultivated multiplied by number of cultivations.

^cAverage number of cultivations (total cultivation/acres cultivated).

Table 29. Number of cultivations of dry beans in 1995 in each Northharvest district in Minnesota and North Dakota.

Northharvest District	Number of Cultivations			
	1	2	3	4
	% of Respondents ^a			
Minnesota				
MN1	10.5	68.4	17.5	3.5
MN2	26.7	46.7	26.7	0
MN3	57.1	35.7	7.1	0
MN4	20.0	66.7	13.3	0
MN5	35.5	45.2	16.1	3.2
MN Total	26.1	56.8	15.3	1.7
North Dakota				
ND1	10.8	66.2	22.3	0.8
ND2	19.7	64.8	15.5	0
ND3	42.5	53.8	3.8	0
ND4	21.3	62.3	14.8	1.6
ND5	58.7	38.1	3.2	0
ND Total	27.7	58.5	13.3	0.2
Northharvest Total	27.2	58.0	13.9	0.7

^a% of respondents answering question.

respondents' acres compared to 5.3% of North Dakota respondents' acres (Table 31). Sodium chlorate was used to treat 6.1% of Minnesota respondents' acres compared to 3.5% of North Dakota respondents' acres (data not shown).

Table 30. Use of rotary hoe on dry beans in 1995 in Minnesota and North Dakota.

	Respondents Using		Acres Cultivated		Total	
	Number	%	Number ^a	%	Acres ^b	Average Number ^c
Minn.	53	24.0	20,542	36.8	34,773	1.7
N.D.	101	22.0	29,126	19.4	34,938	1.2
North.						
Total	154	22.6	49,668	24.1	69,711	1.4

^aNumber of acres cultivated with rotary hoe.

^bAcres cultivated multiplied by number of cultivations.

^cAverage number of cultivations (b/a).

Table 31. Common weed control practices^a in 1995 by respondents in Minnesota and North Dakota.

Weed Control Practice	Acres Treated ^b	
	Number	%
Minnesota		
Cultivation	44,986	80.7
Sonalan, spring applied	33,422	59.9
Bentazon (Basagran, others)	25,079	45.0
Rotary hoe	20,542	36.8
Poast	14,924	26.8
Trifluralin, spring applied	13,051	23.4
Alachlor (Lasso, others)	10,559	18.9
Pursuit	9,251	16.6
Eptam, spring applied	8,925	16.0
Gramoxone Extra	7,388	13.2
North Dakota		
Cultivation	135,316	90.2
Sonalan, spring applied	103,972	69.3
Bentazon (Basagran, others)	90,215	60.1
Rotary hoe	29,126	19.4
Poast	24,857	16.6
Trifluralin, spring applied	23,955	16.0
Pursuit	15,498	10.3
Northharvest Total		
Cultivation	180,302	87.6
Sonalan, spring applied	137,394	66.8
Bentazon (Basagran, others)	115,294	56.0
Rotary hoe	49,668	24.1
Poast	39,781	19.3
Trifluralin, spring applied	37,006	18.0
Pursuit	24,749	12.0

^aPractice used on more than 10% of respondents' acres.

^bRespondents' acres only.

Weed control practices in each state were similar. Pre-plant spring incorporated Sonalan was used on 60% of Minnesota respondents' acres and 69% of North Dakota respondents' acres (Table 31). Bentazon was used on 45% of Minnesota respondents' acres and 60% of North Dakota respondents' acres. Poast was used on 27% of Minnesota and 17% of North Dakota respondents' acres, spring pre-plant incorporated trifluralin was used on 23% of Minnesota and 16% of North Dakota respondents' acres, alachlor (Lasso, others) was used on 19% of Minnesota and no North Dakota respondents' acres, and Pursuit was

used on 17% of Minnesota and 10% of North Dakota respondents' acres.

Spring pre-plant incorporated Sonalan was the most commonly used herbicide in MN1, MN2, ND1, ND3, and ND5 (Table 32). Post-applied bentazon (Basagran, others) was the most commonly used herbicide in MN4, MN5, ND2, and ND4. Post-applied Pursuit was the most commonly used herbicide in MN3.

Respondents rated most weed control practices as providing good weed control. Dual, Poast, Prowl, Pursuit, pre-plant Roundup, spring-applied Sonalan, spring-applied trifluralin, trifluralin + Eptam, and desiccants were among the herbicides rated as most effective (Table 33).

Table 32. Herbicides commonly used in 1995 in each Northharvest district in Minnesota and North Dakota^a.

Northharvest District	Herbicide	- Acres Reported ^b -	
		Number	%
Minnesota			
MN1	Sonalan, spring applied	18,583	68.2
	Bentazon (Basagran, others)	11,166	41.0
	Poast	7,051	25.9
MN2	Sonalan, spring applied	3,686	71.4
	Alachlor (Lasso, others)	2,743	53.1
	Bentazon (Basagran, others)	1,695	32.8
MN3	Pursuit	5,735	70.9
	Sonalan, spring applied	4,778	59.1
	Bentazon (Basagran, others)	3,329	41.2
	Eptam, spring applied	2,806	34.7
	Trifluralin, spring applied	2,181	27.0
MN4	Bentazon (Basagran, others)	3,171	52.4
	Poast	2,959	48.9
	Alachlor (Lasso, others)	2,320	38.3
	Trifluralin, spring applied	2,033	33.6
	Sonalan, spring applied	1,258	20.8
MN5	Bentazon (Basagran, others)	5,718	62.2
	Sonalan, spring applied	5,117	55.7
	Trifluralin, spring applied	3,484	37.9
	Alachlor (Lasso, others)	3,278	35.7
	Poast	3,273	35.6
North Dakota			
ND1	Sonalan, spring applied	32,156	69.3
	Bentazon (Basagran, others)	30,667	66.1
	Poast	14,199	30.6
ND2	Bentazon (Basagran, others)	19,440	70.5
	Sonalan, spring applied	18,631	67.5
ND3	Sonalan, spring applied	26,780	87.0
	Bentazon (Basagran, others)	14,923	48.5
ND4	Bentazon (Basagran, others)	13,311	56.8
	Sonalan, spring applied	11,269	48.1
	Trifluralin, spring applied	7,150	30.5
ND5	Sonalan, spring applied	15,136	69.3
	Bentazon (Basagran, others)	11,874	54.4
	Pursuit	4,800	22.0

^aHerbicide use reported on more than 20% of respondents' acres.

^bDistrict respondents' acres only.

Insect Problems

Potato leafhoppers were the worst insect problem for 0.3% of Northharvest survey respondents representing 2.4% of the dry bean acres reported (Table 34). The potato leafhopper was more frequently reported to be the worst insect problem by Minnesota respondents (12% of respondents representing 7% of Minnesota respondents' acres reported). Spider mites were reported as the worst insect problem by 0.5% of Minnesota respondents on 5% of their acres.

Table 33. Effectiveness of herbicides in 1995 reported by all Northharvest respondents in Minnesota and North Dakota.

Herbicide	Number of Respondents	- Efficacy of Weed Control ^a -		
		Good	Fair	Poor
Alachlor (Lasso, others)	48	37.5	47.9	14.6
Bentazon				
(Basagran, others)	428	39.5	47.9	12.6
Dual	23	52.2	43.5	4.3
Eptam, spring applied	51	44.0	46.0	10.0
Poast	240	60.8	33.3	5.8
Prowl	19	52.6	21.1	26.3
Pursuit	121	74.4	22.3	3.3
Roundup, preplant	88	60.2	28.4	11.4
Sonalan, fall applied	26	26.9	46.2	26.9
Sonalan, spring applied	440	54.8	38.6	6.6
Trifluralin, fall applied	19	47.4	42.1	10.5
Trifluralin, spring applied	148	52.7	37.2	10.1
Trifluralin + Eptam	13	61.5	38.5	0
Desiccants				
(sodium chlorate, Gramoxone Extra)	126	60.3	33.3	6.3

^aData includes all herbicides used on more than 1,000 acres.

The potato leafhopper was reported as the worst insect problem in MN2, MN4, MN5 and ND5 (Table 35). However, it was reported as the worst insect problem on less than 10% of respondents' acres in two of these districts; in contrast, it was the worst insect problem on 44% of MN4 respondents' acres and on 11% of MN2 respondents' acres. These results are similar to those for 1994. Spider mites were reported as the worst insect problem on 34% of MN3 respondents' acres, a much larger figure than for any district in 1994. Grasshoppers were the worst insect problem on 9% of MN2 respondents' acres, on 7% of ND4 respondents' acres and on 4% of MN3 respondents' acres.

Table 34. Worst insect problem^a in 1995 for respondents in Minnesota and North Dakota.

Worst Insect Problem	Respondents		Acres Reported ^b	
	Number	%	Number	%
Minnesota				
Potato Leafhopper	26	11.8	4,052	7.3
Spider Mites	1	0.5	2,745	4.9
Grasshoppers	4	1.8	813	1.5
North Dakota				
Grasshopper	4	0.9	1,849	1.2
Northarvest Total				
Potato Leafhopper	2	0.3	4,872	2.4
Spider Mites	2	0.3	2,857	1.4
Grasshopper	8	1.2	2,662	1.3

^aInsect problems reported on more than 1% of respondents' acres.

^bRespondents' acres only.

Table 35. Worst insect problem^a in 1995 in each Northarvest district for respondents in Minnesota and North Dakota.

Northarvest District	Worst Insect Problem	- Acres Reported ^b -	
		Number	%
Minnesota			
MN2	Potato Leafhopper	555	10.7
	Grasshopper	483	9.4
MN3	Spider Mites	2,745	33.9
	Grasshopper	330	4.1
	Potato Leafhopper	134	1.7
MN4	Potato Leafhopper	2,687	44.4
MN5	Potato Leafhopper	676	7.4
North Dakota			
ND1	Seed Corn Maggot	485	1.0
ND4	Grasshopper	1,650	7.0
ND5	Potato Leafhopper	820	3.8

^aInsect problems reported on more than 1% of respondents' acres.

^bDistrict respondents' acres only.

Insect Control Practices

Insecticide use was very limited in 1995. Carbaryl was used on 1.5% of Minnesota respondents' dry bean acres, followed by dimethoate on 0.9% and Asana on 0.4%. Insecticide use in North Dakota was minimal (Table 36). Insecticide use in 1992 and 1994 also was very low (3, 6).

Crop Rotations

Northarvest respondents reported use of crop rotation on 77% of respondents' acres, up from 70% in 1994. Rotation was reported on 70% of respondents' acres in Minnesota and 79% in North Dakota (Table 37).

Table 36. Insecticide use^a in 1995 by respondents in Minnesota and North Dakota.

Insecticide	Acres Treated ^b	
	Number	%
Minnesota		
Carbaryl	825	1.5
Dimethoate	478	0.9
Asana	205	0.4
North Dakota^c		

^aData includes any insecticide applied to over 0.3% of respondents' acres.

^bRespondents' acres only.

^cNo insecticide applied to more than 0.3% of respondents' acres.

Table 37. Use of crop rotation in 1995 by respondents in Minnesota and North Dakota.

	Acres in Rotation ^a	
	Number	%
Minnesota	39,085	70.1
North Dakota	119,095	79.4
Northarvest Total	158,180	76.9

^aRespondents' acres only.

Crop rotations used by Northharvest respondents usually involved several years between dry bean crops (Table 38). The number of years since the previous dry bean crop had been grown was cited as two by 13% of respondents, three by 34%, four by 22%, five or more by 12% and never before (in that field) by 16%. More Minnesota respondents (23%) reported they had never planted dry beans in that field than North Dakota respondents (11%). The data are similar to 1994.

Wheat preceded dry beans for 56% of survey respondents, followed by corn for 19% and barley for 17%. There were differences between states, however, with wheat (65%) and barley (22%) used most frequently by North Dakota respondents and corn (43%) and wheat (38%) by Minnesota respondents (Table 39). These data are similar to 1992 and 1994 (3,6). Sugarbeets were used by 5% of respondents, up from 3% in 1994.

Table 38. Crop rotation in 1995 by respondents in Minnesota and North Dakota.

No. of Years Since Previous Dry Bean Crop	Minnesota	North Dakota	Northharvest
	----- % of Respondents* -----		
0	1.0	0.2	0.5
1	1.0	2.3	1.9
2	13.4	13.4	13.4
3	23.8	38.7	33.9
4	19.3	23.1	21.9
5	7.4	5.3	6.0
6+	6.5	6.2	6.3
Never before	22.7	10.6	16.1

* Percent of those responding to question.

Table 39. Crop rotation. Crop grown by respondents in Minnesota and North Dakota preceding the 1995 dry bean crop.

Preceding Crop	Minnesota	North Dakota	Northharvest
	----- % of Respondents* -----		
Alfalfa	0.5	0	0.2
Barley	6.5	21.8	16.7
Corn	43.1	7.0	18.9
Oat	0.5	0.2	0.3
Potato	2.8	0.7	1.4
Rye	0.5	0	0.2
Soybean	1.9	0.2	0.8
Sugarbeet	6.0	4.1	4.7
Summer Fallow	0	0.5	0.3
Sunflower	0	0.2	0.2
Wheat	38.4	65.1	56.3

* Percent of those responding to question.

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