Extension Report No. 13

1991

Dry Bean Grower Survey

of

Pest Problems and Pesticide Use

in

Minnesota and North Dakota

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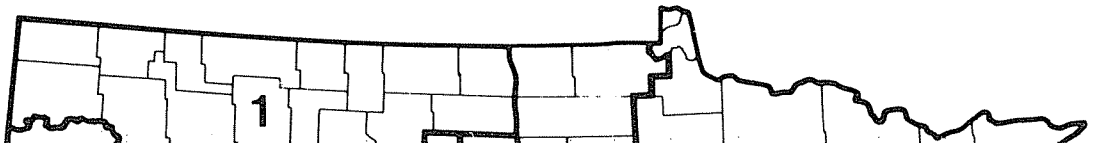
Introduction

This is the fifth annual survey of pest problems, pesticide use and grower practices of the Northarvest Bean Growers Association, comprised of dry bean growers in Minnesota and North Dakota. Results of previous surveys have been published (1, 2, 3, 5). The survey form (Figure 1) was designed with input from research and extension faculty at North Dakota State University, the University of Minnesota, and the directors of Northarvest Bean Growers Association. The survey was mailed on November 15, 1991 to all 5,501 growers in the bi-state area.



PLEASE CIRCLE OR FILL IN THE REQUESTED INFORMATION ON PEST PROBLEMS AND PESTICIDE USE ON YOUR 1991 DRY BEAN CROP.

ND 3

Total acres planted in 1991 _____

Irrigated acres _____ Dryland acres _____

Total acres harvested _____

Acres with hail damage _____

STATE AND COUNTY WHERE GROWN
(If beans are grown in more than one county, list each county and acres.)

State	County	Acres
MN		
ND		
SD		

VARIETY GROWN IN 1991

Variety	Acres
PINTO	
Fiesta	
Nodak	
Olathe	
Othello	
RS101	
Topaz	
Other (specify)	
Other (specify)	
Other (specify)	
NAVY	
Albion	
C-20	
Fleetwood	
Hyden	

BIGGEST WEATHER PROBLEM IN DRY BEANS IN 1991 (circle one)
Drought
Flooding
Frost
Hail
Wind/Sandblasting
Other (specify) _____

BIGGEST PRODUCTION PROBLEM IN 1991 (circle one)
None
Weeds
Emergence/Stand
Insects (specify)
Disease
Micronutrient deficiency
Applied Herbicide Injury
Herbicide Drift Injury
Other (specify) _____

INTEGRATED PEST MANAGEMENT
Did you hire a consultant to scout dry beans?

1991	prior to 1991
a) yes	a) yes

EVALUATE WEED CONTROL AND DRY BEAN INJURY
Mark weed control used and indicate acres treated for each item. Count double applications, double cultivation, etc.

Weed Control Used	Acres Treated	WEED CONTROL 1 = Excellent 2 = Good 3 = Fair 4 = Poor	BEAN INJURY 1 = None 2 = Slight 3 = Moderate 4 = Severe
Roundup (preplant)		1 2 3 4	1 2 3 4
Eptam (fall)		1 2 3 4	1 2 3 4
Eptam (spring)		1 2 3 4	1 2 3 4
Treflan (fall)		1 2 3 4	1 2 3 4
Treflan + Eptam		1 2 3 4	1 2 3 4
Sonalan (fall)		1 2 3 4	1 2 3 4
Sonalan (spring)		1 2 3 4	1 2 3 4
Amiben		1 2 3 4	1 2 3 4
Lasso		1 2 3 4	1 2 3 4
Dual		1 2 3 4	1 2 3 4
Prowl		1 2 3 4	1 2 3 4
Basagran		1 2 3 4	1 2 3 4
Poast		1 2 3 4	1 2 3 4
No herbicide used		1 2 3 4	1 2 3 4
Cultivation		1 2 3 4	1 2 3 4
Rotary Hoe		1 2 3 4	1 2 3 4
Hand Weeding		1 2 3 4	1 2 3 4
Other			
DESICCANTS:			
Sodium Chlorate		1 2 3 4	
Grammoxone Extra		1 2 3 4	

WORST WEED PROBLEMS IN DRY BEANS IN 1991
(rank 1-3, 1 = worst)
Redroot pigweed

WORST INSECT/MITE PROBLEM IN 1991 (rank 1-3, 1 = worst)
_____ Grasshoppers
Leafhoppers

Responses

The surveys were mailed out by Northarvest district, with the district number marked in the corner of the form. For purposes of this discussion districts are identified as MN1 through MN5 and ND1 through ND5 (Figure 2). We received 842 useable responses, or a return of 15%. These returned surveys represented 203,916 acres or 32% of the Northarvest total of 645,000 A planted (4) (Table 1). The return rate and percent of total acres represented in the survey are similar to the rates and percentages for previous years.

The number of respondents and acres planted varied widely by district (Table 2). ND1 had the most respondents and respondents' acres planted, but all North Dakota districts had nearly 100 or more respondents and from 24,924 to 44,953 respondents' acres planted. MN2 and MN5 had very few respondents and very few respondents' acres planted. MN1, MN3 and MN4 each had 63 to 89 respondents and 8,830 to 12,539 respondents' acres planted.

Irrigation and Chemigation

A significant percentage of Minnesota's acres was irrigated, with the percentage as high as 77% in MN2 (Table 3). Chemicals were applied through the irrigation system (chemigation) to only a small portion of irrigated acres. Most of these applications were fertilizers, but a few were fungicides (Table 4).

Table 1. Number of growers contacted, respondents, total acres and acres planted by Minnesota and North Dakota respondents in 1991.

	Growers			Acres Planted		
State	Contacted	Responded	% Responded	Total[a]	Planted by Respondents	Respondents' Acres % of Total
Minnesota	1,191	229	19.2	125,000	34,777	27.8
North Dakota	4,310	613	14.2	520,000	169,139	32.5
Northarvest Total	5,501	842	15.3	645,000	203,916	31.6

Zinc Usage

Zinc was applied as a micronutrient on 17% of respondents' acres. It was used on a slightly higher percentage of respondents' acres in North Dakota than in Minnesota (Table 5).

Use of Bagged and Tagged Seed

The planting of bagged and tagged seed, which was down in 1990 (2), returned to previous levels in 1991, with 94% of respondents' acres planted with bagged and tagged seed (Table 6). Bagged and tagged seed was planted on 93% of Minnesota respondents' acres and 87% of North Dakota respondents' acres. Use of bagged and tagged seed varied by district from a high of 100% of respondents' acres in MN2 to a low of 79% in ND1.

Varieties Grown

Plantings of the pinto bean variety Othello increased dramatically in 1991, with 34% of respondents choosing this cultivar for 22% of their acres (Table 7). The second and third most commonly planted varieties were Upland navy, planted by 29% of respondents on 15% of their acres, and Topaz pinto, planted by 27% of respondents on 14% of their acres. In 1990 Othello was the third most commonly planted variety behind Upland and Topaz (2), and it was the fourth most commonly planted variety in 1989 (3). Other varieties commonly grown in 1991 were Nodak pinto, planted by 13% of respondents on 8% of their acres; Fiesta pinto, planted by 11% of respondents on 6% of their acres; and kidney beans, planted by 7% of respondents on 6% of their acres.

Table 4. Type of chemigation used in 1991 by respondents in Minnesota and North Dakota.

Type of Chemigation	-- Respondents -- Number	%	------ Acres[a] ------ Number	%
Minnesota				
Fungicide	1	0.4	180	0.5
Fertilizer	11	4.8	2855	7.9

Table 6. Use of bagged and tagged seed in 1991 by respondents in each Northarvest district of Minnesota and North Dakota.

Northarvest District	% of Respondents' Acres Planted with Bagged and Tagged Seed
Minnesota	
MN1	82.2

Kidney beans were the most commonly grown type in Minnesota, although variety names were not provided (Table 8). Upland navy was the second most commonly grown dry bean variety in Minnesota, followed by Fiesta pinto. Othello pinto, Topaz pinto, and Upland navy were the most commonly grown dry beans in North Dakota.

Hail Damage

Hail damage in the bi-state area was down from 10% of respondents' acres affected in 1990 (2) to 7% in 1991. Hail damaged a lower percentage of North Dakota respondents' acres in 1991 (6%) than in 1990 (10%), but a higher percentage of Minnesota respondents' acres in 1991 (12%) than in 1990 (9%) (Table 9).

Weather Problems

The worst weather problems in Minnesota in 1991 were flooding and wet conditions, as reported by 53% of Minnesota respondents on 39% of their acres. In North Dakota, drought was the worst weather problem for 42% of North Dakota respondents on 41% of their acres. However, 22% of North Dakota respondents reported problems with flooding and wet conditions on 24% of their acres (Table 10). This compares with 1990 (2) when drought was the worst weather problem in both Minnesota (51% of respondents on 68% of their acres) and North Dakota (85% of respondents on 87% of their acres). Hail was reported to be the worst weather problem in 1991 by 10% of Minnesota respondents on 12% of their acres, but by only 6% of North Dakota respondents on 7% of their acres. Hail was reported more frequently as a problem in 1991 than in 1990 even though total hail damaged acres reported by respondents was down in 1991.

Table 7. Varieties grown[a] in 1991 by all Northarvest respondents in Minnesota and North Dakota.

		Respondents		Acres Planted[b]	
Variety	Type[d]	Number	%	Number	%

Table 8. Varieties most commonly grown in 1991 by respondents in Minnesota and North Dakota.

		Acres Planted[a]	
Variety	Type	Number	%

Production Problems

The primary production problem for Minnesota and North Dakota respondents was weeds, followed by diseases and insects (Table 11). Weeds were reported to be the worst production problem by 24% of respondents with 23% of their acres affected. Diseases were reported to be the worst production problem by 15% of respondents with 20% of their acres affected. There were few differences in the frequency of weed or disease problems between the two states. Insects were reported to be the worst production problem by 10% of respondents with 9% of their acres affected. Insects were more frequently reported to be a problem in Minnesota (12% of respondents with 14% of their acres affected) than in North Dakota (10% of respondents with 8% of their acres affected).

Weed Problems

The worst weed problem for all respondents in both states was wild mustard (25% of respondents with 33% of their acres affected), followed by foxtail (13% of respondents with 10% of their acres affected), common cocklebur (12% of respondents with 10% of their acres affected) and kochia (11% of respondents with 12% of their acres affected). Other commonly reported weeds included redroot pigweed, eastern black nightshade and common lambsquarters (Table 12).

The worst weed problems for Minnesota respondents were common lambsquarters with 18% of Minnesota respondents' acres affected, followed by wild mustard with 15% of acres affected, redroot pigweed with 14%, common cocklebur with 11%, foxtail with 11% and eastern black nightshade with 11%. The worst weed problems for North Dakota respondents were wild mustard with 36% of North

Table 9. Hail damage in 1991 to respondents' beans in each Northarvest district of Minnesota and North Dakota.

Northarvest	Respondents Reporting Hail	Acres Damaged[a]

Table 10. Worst weather problem in 1991 for respondents in Minnesota and North Dakota.

Worst Weather Problem	Respondents		Acres Affected[a]	
	Number	%	Number	%

Dakota respondents' acres affected, followed by kochia with 14%, foxtail with 10% and common cocklebur with 9% (Table 13).

The worst weed varied somewhat by district. Wild mustard most frequently was ranked as the worst weed in MN1 and all five North Dakota districts. Lambsquarters most frequently was ranked as the worst weed in MN2 and MN3, eastern black nightshade in MN4 and redroot pigweed in MN5. Redroot pigweed was the second worst weed in MN1 and MN3. Kochia was the second worst weed in ND1, ND2 and ND3. Foxtail was the second worst weed in MN4, MN5 and ND4 (Table 14).

Table 11. Worst production problem in 1991 for respondents in Minnesota and North Dakota.

Worst Production Problem	Respondents		Acres Affected[a]	
	Number	%	Number	%
Minnesota				
Diseases	31	13.5	7,221	20.7
Weeds	52	22.7	6,642	19.1
Insects	27	11.8	4,909	14.1
Emergence/stand	18	8.3	2,636	7.6
Herbicide injury	5	2.2	1,230	3.5
Weather	13	5.7	867	2.5

Table 12. Worst weed problem[a] in 1991 for all Northarvest respondents in Minnesota and North Dakota.

Worst Weed Problem	Respondents		Acres Affected[b]	
	Number	%	Number	%
Wild Mustard	192	24.7	66,761	32.7
Kochia	83	10.7	24,412	12.0
Foxtail	104	13.4	20,290	10.0
Common Cocklebur	93	12.0	19,837	9.7
Redroot Pigweed	77	9.9	15,621	7.7
Eastern Black Nightshade	55	7.1	11,454	5.6
Common Lambsquarters	35	4.5	9,553	4.7
Ragweed	12	1.3	5,263	2.6
Wild Oats	24	3.1	4,464	2.2
Marshelder	9	1.2	2,642	1.3
Canada Thistle	10	1.3	1,771	0.9

[a]Ranked as No. 1 weed problem on more than 0.5% of respondents' acres.
[b]Respondents' acres only.

Table 13. Worst weed problem[a] in 1991 for respondents in Minnesota and North Dakota.

Worst Weed Problem	Respondents		Acres Affected[b]	
	Number	%	Number	%
Minnesota				
Common				

Table 14. Worst weed problem[a] in 1991 for respondents in each Northarvest district of Minnesota and North Dakota.

Northarvest District	Worst Weed Problem	Respondents No.	Respondents %	Acres Affected[b] Number	Acres Affected[b] %
Minnesota					
MN1	Wild Mustard	23	40.4	5,112	40.8
	Redroot Pigweed	10	17.5	1,878	15.0
	Lambsquarters	4	7.0	1,345	10.7
MN2	Lambsquarters	3	75.0	1,636	98.5
MN3	Lambsquarters	9	10.6	2,293	20.0
	Redroot Pigweed	11	12.9	2,199	19.2
	Cocklebur	20	23.5	2,023	17.6
	Black Nightshade	15	17.6	1,594	13.9
	Foxtail	12	14.1	1,365	11.9
MN4	Black Nightshade	17	29.8	2,091	23.7
	Foxtail	11	19.3	1,495	16.9
	Ragweed	5	8.8	1,450	16.4
	Cocklebur	7	12.3	1,432	16.4
	Lambsquarters	5	8.8	1,053	11.9
MN5	Redroot Pigweed	3	33.3	118	43.4
	Foxtail	2	22.2	60	22.1
	Black Nightshade	2	22.2	54	20.0
	Lambsquarters	1	11.1	30	11.0
North Dakota					
ND1	Wild Mustard	74	45.7	21,662	48.2
	Kochia	24	14.8	6,818	15.2

Weeds that most frequently were ranked as one of the three worst weeds by Minnesota respondents included redroot pigweed with 45% of respondents' acres affected, followed by common lambsquarters with 41% affected, foxtail with 31%, wild mustard with 29%, eastern black nightshade with 26%, and common cocklebur with 24%. Weeds that most frequently were ranked as one of the three worst weeds by North Dakota respondents were wild mustard with 66% of respondents' acres affected, followed by kochia with 38% affected, foxtail with 27%, common cocklebur with 25% and redroot pigweed with 25% (Table 15).

Table 15. Weeds ranked as one of the three worst[a] in 1991 by respondents in Minnesota and North Dakota.

No. 1, No. 2, or No. 3 Weed Problem	Respondents Number	Respondents %	Acres Affected[b] Number	Acres Affected[b] %
Minnesota				
Redroot Pigweed	79	37.3	15,566	44.8
Common Lambsquarters	73	34.4	14,232	40.9
Foxtail	78	36.8	10,911	31.4
Wild Mustard	50	23.6	9,921	28.5
Eastern Black Nightshade	63	29.7	8,937	25.7
Common Cocklebur	63	29.7	8,156	23.5

Respondents rated most weed control practices as giving no injury or only slight injury (Table 21). Fall applied Sonalan and fall applied trifluralin were among the weed control chemicals rated as providing the lowest level of bean injury.

Insect Problems

Grasshoppers were the worst insect problem for 74% of respondents on 63% of their acres, followed by potato leafhopper for 13% of respondents on 12% of their acres (Table 22). Grasshoppers were more frequently reported to be the worst problem by North Dakota respondents (84% of respondents on 69% of their acres) than by Minnesota respondents (38% of respondents on 31% of their acres), but the potato leafhopper was more frequently reported as the worst insect problem by Minnesota respondents (35% of respondents on 29% of their acres) than by North Dakota respondents (7% of respondents on 8% of their acres).

The grasshopper was most frequently ranked as the worst insect problem in MN1 and all five North Dakota districts (Table 23). It also was most frequently ranked as one of the three worst insect problems in the same districts (Table 24). The potato leafhopper was most frequently ranked as the worst insect problem in MN2, MN3, MN4 and MN5; it also was most frequently ranked as one of the three worst insect problems in these same districts.

Table 21. Bean injury from weed control practices in 1991 reported by all Northarvest respondents in Minnesota and North Dakota.

Weed Control Practice	Number of Respondents	Degree of Bean Injury[a] 1	2	3	4
		% of Respondents			
Alachlor	32	50.0	46.9	0	3.1
Amiben	18	66.7	22.2	5.6	5.6
Bentazon	249	55.0	39.4	4.4	1.2
Cultivation	335	51.9	46.9	0.9	0.3
Dual	17	70.6	29.4	0	0
Eptam, spring applied	26	88.5	11.5	0	0
Glyphosate	40	97.5	2.5	0	0
Hand weeding	104	74.0	23.1	2.9	0
No herbicide	4	100.0	0	0	0

Table 23. Worst insect problem[a] in 1991 in each Northarvest district for respondents in Minnesota and North Dakota.

Northarvest District	Worst Insect Problem	Respondents No.	%	Acres Affected[b] Number	%
Minnesota					
MN1	Grasshopper	43	81.1	8,958	71.4
	Seed Corn Maggot	1	1.9	500	4.0

Insecticides were used on only 7% of respondents' acres in North Dakota but on 26% of respondents' acres in Minnesota (Table 25). Asana XL was the insecticide most frequently used, followed by Cygon and Sevin. Lorsban was used by three respondents on 433 acres; this product is registered for seed treatment only, and it is presumed that this was the method of use for this product.

Table 24. Insects ranked as one of the three worst[a] in 1991 in each Northarvest district in Minnesota and North Dakota.

Northarvest District	No.1, No.2, or No. 3 Insect Problem	Respondents Number	Respondents %	Acres Affected[b] Number	Acres Affected[b] %
Minnesota					
MN1	Grasshopper	45	84.9	9,588	76.5
	Leafhopper	8	15.1	1,640	13.1
	Seed Corn Maggot	1	1.9	500	4.0
MN2	Leafhopper	1	33.3	1,000	60.2
MN3	Leafhopper	22	47.8	4,246	37.0
	Grasshopper	20	43.5	3,482	30.3
	Seed Corn Maggot	3	6.5	900	8.6
	Spider Mites	3	6.5	130	1.1
MN4	Leafhopper	33	82.5	6,221	70.5
	Grasshopper	11	27.5	1,929	21.8
	Spider Mites	7	17.5	765	8.7
	Seed Corn Maggot	3	7.5	710	8.0
MN5	Leafhopper	6	66.7	153	56.3

Disease Problems

White mold was ranked as the worst disease problem on 33% of respondents' acres, followed by rust on 13% and bacterial blight on 11% (Table 26). Rust was ranked as the worst disease problem on 14% of North Dakota respondents' acres but only 7% of Minnesota respondents' acres. Root rot was inadvertently omitted from the survey form and was not mentioned by respondents as a problem.

Table 25. Insecticide usage[a] in 1991 by respondents in Minnesota and North Dakota.

Insecticide	Respondents Number	Respondents %	Acres Treated[b] Number	Acres Treated[b] %
Minnesota				
Asana XL	16	7.0	5,077	14.6
Cygon	14	6.1	1,741	5.0
Sevin	4	1.7	666	1.9
Lorsban	3	1.3	433	1.2
Other	7	3.1	1,204	3.5
North Dakota				
Asana XL	53	8.6	7,039	4.2
Sevin	22	3.6	1,704	1.0
Cygon	7	1.1	986	0.6
Other	17	2.8	1,828	1.1
Northarvest (MN and ND)				
Asana XL	69	8.2	12,116	5.9
Cygon	21	2.5	2,727	1.3

White mold was most frequently ranked as one of the three worst diseases by respondents in both states with 45% of their acres affected, followed by bacterial blight on 29% of acres and rust on 27%. Rankings were almost identical for both states (Table 27).

White mold was most frequently ranked as the worst disease problem in MN2, MN3, MN4, ND1 and ND2. In general, districts that ranked white mold as the worst disease problem ranked it very high: 96% of respondents' acres in MN2, 57% in ND2, 55% in ND1, and 45% in MN4. Bacterial blight was most frequently ranked as the worst disease problem by respondents in MN1, MN5, and ND3. Rust was most frequently ranked as the worst disease problem by respondents in ND4 and ND5 (Table 28).

Fungicides were used on only 16% of Minnesota respondents' acres and 9% of North Dakota respondents' acres (Table 29). Respondents in both states made limited use of Benlate, Bravo, Champion, Kocide, Thiolux and Top Cop, but the major fungicide used was Topsin (nearly 8% of respondents' acres). About twice as many respondents' acres were banded with Topsin as were broadcast (10,139 acres versus 5,586). Banded application reduces application amounts per acre to approximately half that of the broadcast rate, limiting the amount of chemical applied to the soil and increasing the profit potential. Total use of Topsin was greater in Minnesota where 11% of respondents' acres were treated, as compared to North Dakota where 7% of respondents' acres were treated.

Table 27. Diseases ranked as one of the three worst[a] in 1991 by respondents in Minnesota and North Dakota.

Table 28. Worst disease problem[a] in 1991 in each Northarvest district for respondents in Minnesota and North Dakota.

Northarvest District	Worst Disease Problem	Acres Affected[b] Number	Acres Affected[b] %
Minnesota			
MN1	Bacterial Blight	2,153	17.2
MN2	White Mold	1,600	96.3
MN3	White Mold	2,574	22.4
MN4	White Mold	3,939	44.6
MN5	Bacterial Blight	40	14.7
North Dakota			
ND1	White Mold	24,841	55.3
ND2	White Mold	19,051	57.2
ND3	Bacterial Blight	3,175	12.7
ND4	Rust	5,279	17.5

Crop Rotations

Crop rotations used by respondents usually involved several years between dry bean crops (Table 30). The number of years since the previous dry bean crop had been grown was cited as two by 14% of respondents, three by 32%, four by 20%, five or more by 15% and never before (in that field) by 17%. More Minnesota respondents (33%) reported that they had never planted dry beans in that field than North Dakota respondents (11%).

Wheat was the crop that preceded dry beans for 57% of respondents, followed by barley and corn. There were differences between states, however, with wheat (65%) and barley (24%) used most frequently by North Dakota respondents and corn (42%) and wheat (39%) by Minnesota respondents (Table 31).

Table 30. Crop rotation in 1991 by respondents in Minnesota and North Dakota.

No. of Years Since Previous Dry Bean Crop	Minnesota	North Dakota	Northarvest
	% of Respondents		
1	1.3	2.2	2.0
2	8.0	16.7	14.3
3	20.7	35.7	31.6

Use of Consultants

Consultants were hired to scout dry bean crops by 17% of respondents (Table 32). This figure is up from 14% in 1990 (2). The percent of respondents using consultants in 1991 was slightly higher in Minnesota with 20% than in North Dakota with 16%.

Pesticide Use

Less pesticide use in 1991 than in past years was reported by 26% of respondents, the same by 64% and more by 10% (Table 33). Reasons most frequently cited by respondents for less pesticide use were fewer pests and that the application would not be economically justified.

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