Agronomy Report 1 February 1980

Pesticide usage in major North Dakota crops

1978

North Dakota State University
in cooperation with
North Dakota Crop and Livestock Reporting Service

Dr. John D. Nalewaja, Agronomy Department
Dr. Alan G. Dexter, Agronomy Department
Mr. John Buchli, Plant Pathology Department
Mr. William Hamlin, N.D. Crop and Livestock Reporting Service
Mr. Greg Kimmet, N.D. Crop and Livestock Reporting Service

The survey was supported by a grant from the North Central Regional Pesticide Impact Assessment Program of Cooperative Research, Science and Education Administration, United States Department of Agriculture.

Table 1. Acreage planted, acreage treated and percentage of planted acreage treated with pesticides in crops, North Dakota, 1978.

Crop	Acres planted[1]	Pesticide treated acres[2]							
		Herbicide	Insecticide	Fungicide	Other[3]	Herbicide	Insecticide	Fungicide	Other[3]
	(1000)	(1000)	(1000)	(1000)	(1000)	(%)	(%)	(%)	(%)
Wheat	9760.0	8612.2	307.4	774.0	0.0	88.2	3.2	7.9	0.0
Barley	2500.0	2163.0	77.5	210.5	0.0	86.5	3.1	8.4	0.0
Oats	1350.0	520.3	11.2	44.7	0.0	38.5	1.0	3.3	0.0
Flax	425.0	205.8	5.4	16.3	0.0	48.3	1.3	3.8	0.0
Corn	600.0	312.8	25.1	7.8	1.9	52.1	4.2	1.3	0.3
Sunflowers	1890.0	1673.0	105.1	42.3	38.9	88.5	5.6	2.2	2.1
Potatoes	125.3[4]	25.7	113.8	68.3	58.3	20.5	90.8	54.5	46.5
Sugarbeets	153.9[4]	143.8	63.2	11.5	2.4	93.4	41.1	7.5	1.6
Soybeans	175.0	160.8	10.9	3.5	0.0	91.9	6.2	2.0	0.0
Dry beans	105.0[4]	91.3	0.6	16.8	0.0	87.0	0.6	16.0	0.0
Alfalfa hay harvested	1980.0	4.4	4.4	0.0	0.0	0.2	0.2	0.0	0.0
Other hay harvested	1530.0	19.9	0.0	0.0	0.0	1.3	0.0	0.0	0.0
Pasture & range	11767.6	235.4	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Others[5]	—	—	—	—	—	16.0	2.0	0.1	0.1
Total	32361.8	14168.4	724.6	1188.7	73.9	43.8	4.9	5.1	.4

[1]*Preliminary estimates as published in North Dakota Crop and Livestock Statistics (Ag Statistics #44) May 1979, issued jointly by NDSU and the North Dakota Crop and Livestock Reporting Service. Exception: Pasture and Range which are U.S. Census figures.*
[2]*Multiple applications to the same acreage were totaled as one application.*
[3]*See tables on pesticide usage in sunflower and potatoes for listing of other category pesticides. Desiccants were the primary other category pesticides in sunflowers and desiccants and sprout inhibitors in potatoes.*
[4]*Major producing counties, only.*
[5]*Main crops in other category are rapeseed, tame mustard and millet with estimated planted acreages of 45,000, 100,000 and 75,000.*

Table 2. Acreage planted, acreage treated, and percentage of acreage treated with pesticides in Crop Reporting Districts of North Dakota, 1978.

Reporting districts & No.		Acres planted	Pesticide treated acres[2]							
			Herbicide	Insecticide	Fungicide	Other	Herbicide	Insecticide	Fungicide	Other
		(1000)	(1000)	(1000)	(1000)	(1000)	(%)	(%)	(%)	(%)
Wheat										
Northwest	1	1549.7	1363.6	41.8	186.9	0.0	87.9	2.7	12.0	0.0
North central	2	1057.9	962.1	53.8	101.2	0.0	90.9	5.0	9.5	0.0
Northeast	3	1659.7	1575.4	72.2	139.4	0.0	94.9	4.3	8.4	0.0
West central	4	836.3	669.0	12.2	70.8	0.0	80.0	1.4	8.4	0.0
Central	5	1091.4	1010.4	39.6	62.9	0.0	92.5	3.6	5.7	0.0
East central	6	973.8	915.5	40.9	108.8	0.0	94.0	4.2	11.1	0.0
Southwest	7	865.6	679.7	11.1	67.3	0.0	78.5	1.2	7.7	0.0
South central	8	709.8	530.2	1.5	4.9	0.0	74.6	0.2	0.7	0.0
Southeast	9	1015.8	906.2	34.0	31.9	0.0	89.2	3.3	3.1	0.2
Total		9760.0	8615.1	307.1	774.1	0.0	88.2	3.2	7.9	0.0
Barley										
Northwest	1	136.8	105.4	1.7	11.9	0.0	77.0	1.2	8.7	0.0
North central	2	285.7	228.9	6.4	23.2	0.0	80.1	2.2	8.1	0.0
Northeast	3	909.2	821.0	22.0	61.7	0.0	90.3	2.4	6.8	0.0
West central	4	51.1	24.9	0.0	1.3	0.0	48.7	—	2.5	0.0
Central	5	161.9	138.9	6.8	15.5	0.0	85.7	4.2	9.6	0.0
East central	6	595.1	548.7	34.5	77.2	0.0	92.2	5.8	12.9	0.0
Southwest	7	56.3	39.6	0.0	7.9	0.0	70.4	—	14.2	0.0
South central	8	57.2	34.1	0.5	1.8	0.0	59.6	0.8	3.2	0.0
Southeast	9	246.7	221.2	5.5	9.7	0.0	89.7	2.2	3.9	0.0
Total		2500.0	2162.7	77.4	210.2	0.0	86.5	3.1	8.4	0.0

Table 2. continued

Reporting districts & No.		Acres planted	Pesticide treated acres[2]							
			Herbicide	Insecticide	Fungicide	Other	Herbicide	Insecticide	Fungicide	Other
		(1000)	(1000)	(1000)	(1000)	(1000)	(%)	(%)	(%)	(%)
Oats										
Northwest	1	149.5	38.7	0.0	7.2	0.0	25.9	0.0	4.8	0.0
North central	2	133.0	46.5	3.8	4.4	0.0	34.9	2.8	3.3	0.0
Northeast	3	57.1	33.1	0.0	1.8	0.0	57.9	0.0	3.1	0.0
West central	4	173.5	34.4	0.0	1.6	0.0	19.8	0.0	0.9	0.0
Central	5	147.8	62.9	0.0	5.2	0.0	42.6	0.0	3.5	0.0
East central	6	80.3	52.9	0.7	5.0	0.0	65.9	0.9	6.2	0.0
Southwest	7	144.4	46.6	0.8	10.5	0.0	32.2	0.5	7.3	0.0
South central	8	213.9	57.2	1.1	1.7	0.0	26.7	0.5	0.8	0.0
Southeast	9	250.5	147.9	4.9	7.4	0.0	59.1	1.1	2.9	0.0
Total		1350.0	520.2	11.3	44.8	0.0	38.5	1.0	3.3	0.0
Flax										
Northwest	1	45.4	19.2	0.0	0.0	0.0	42.3	0.0	0.0	0.0
North central	2	76.9	39.8	4.2	6.0	0.0	51.8	5.5	7.8	0.0
Northeast	3	46.8	24.5	0.0	0.3	0.0	52.3	0.0	0.7	0.0
West central	4	22.8	7.1	0.0	0.0	0.0	31.0	0.0	0.0	0.0
Central	5	54.0	22.6	0.0	3.7	0.0	41.9	0.0	6.9	0.0
East central	6	41.5	26.9	1.2	0.9	0.0	64.8	3.0	2.2	0.0
Southwest	7	4.5	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South central	8	33.6	13.7	0.0	0.0	0.0	40.9	0.0	0.0	0.0
Southeast	9	99.5	52.0	0.0	5.3	0.0	52.3	0.0	5.4	0.0
Total		425.0	205.8	5.4	16.2	0.0	48.3	1.3	3.8	0.0
Corn										
Northwest	1	5.7	1.0	0.0	0.0	1.6	16.9	0.0	0.0	28.1
North central	2	16.2	8.5	0.3	0.0	0.0	52.5	1.7	0.0	0.0
Northeast	3	22.3	16.2	3.1	0.5	0.0	72.5	14.1	2.4	0.0
West central	4	47.3	13.0	0.0	0.0	0.0	27.6	0.0	0.0	0.0
Central	5	47.9	7.2	2.0	0.0	0.0	15.0	4.2	0.0	0.0
East central	6	58.2	40.4	0.0	0.6	0.0	69.4	0.0	1.1	0.0
Southwest	7	34.0	5.7	0.0	0.0	0.0	16.9	0.0	0.0	0.0
South central	8	88.5	17.0	0.0	0.0	0.0	19.2	0.0	0.0	0.0
Southeast	9	279.9	203.8	19.7	6.7	0.3	72.8	7.1	2.4	0.1
Total		600.0	312.8	25.1	7.8	1.9	52.1	4.2	1.3	0.3
Sunflower										
Northwest	1	63.6	58.1	3.5	0.0	0.8	91.3	5.4	0.0	1.2
North central	2	146.9	113.6	23.5	1.1	5.4	77.4	16.0	0.7	3.7
Northeast	3	361.5	311.4	13.4	8.0	11.4	86.1	3.7	2.2	3.2
West central	4	21.1	20.2	0.0	0.0	3.8	95.7	0.0	0.0	17.9
Central	5	368.2	331.2	3.9	0.0	0.9	90.0	1.1	0.0	0.2
East central	6	514.9	484.2	29.7	23.2	6.4	94.0	5.8	4.5	1.3
Southwest	7	32.0	31.8	0.9	0.0	2.3	99.3	3.0	0.0	7.3
South central	8	19.8	17.5	6.3	0.0	0.0	88.4	31.7	0.0	0.0
Southeast	9	362.0	304.6	23.7	10.4	7.9	84.1	6.6	2.9	2.2
Total		1890.0	1672.6	104.9	42.7	38.9	88.5	5.6	2.2	2.1
Soybeans[1]										
North central	2	1.4	1.4	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Northeast	3	3.8	3.6	0.0	0.0	0.0	94.8	0.0	0.0	0.0
West central	4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East central	6	85.3	74.5	7.1	3.5	0.0	87.3	8.4	4.1	0.0
South central	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southeast	9	84.2	81.4	3.7	0.0	0.0	96.7	4.5	0.0	0.0
Total		175.0	160.9	10.8	3.5	0.0	91.9	6.2	2.0	0.0

Table 2. continued

Reporting districts & No.		Acres planted	Pesticide treated acres[2]							
			Herbicide	Insecticide	Fungicide	Other	Herbicide	Insecticide	Fungicide	Other
		(1000)	(1000)	(1000)	(1000)	(1000)	(%)	(%)	(%)	(%)
Drybeans[1]										
Northeast	3	62.2	56.6	0.0	15.8	0.0	91.0	0.0	25.4	0.0
East central	6	32.2	27.0	0.6	1.0	0.0	83.9	2.0	3.2	0.0
Southeast	9	10.6	7.8	0.0	0.0	0.0	73.1	0.0	0.0	0.0
Total		105.0	91.4	0.6	16.0	0.0	87.0	0.6	16.0	0.0
Potatoes[1]										
Northeast	3	119.3	24.5	109.0	65.4	57.9	20.5	91.4	54.9	48.6
East central	6	6.0	1.2	4.8	2.9	0.3	19.7	80.1	47.5	5.4
Total		125.3	25.7	113.8	68.3	58.2	20.5	90.8	54.5	46.5
Sugarbeet[1]										
Northwest	1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northeast	3	69.8	64.9	36.0	11.5	0.0	93.0	51.5	16.5	0.0
West central	4	6.2	5.9	0.2	0.0	0.0	96.1	3.6	0.0	0.0
East central	6	50.3	49.4	21.6	0.0	2.4	98.4	43.0	0.0	4.8
Southeast	9	24.6	23.6	5.4	0.0	0.0	95.7	22.1	0.0	0.0
Total		154.0	143.8	63.2	11.5	2.4	93.4	41.1	7.5	1.6
Alfalfa Hay[1]										
Northwest	1	156.3	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
North central	2	168.3	2.8	0.4	0.0	0.0	1.7	0.3	0.0	0.0
Northeast	3	66.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West central	4	269.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	5	280.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East central	6	88.7	0.0	0.9	0.0	0.0	0.0	1.0	0.0	0.0
Southwest	7	285.4	0.0	1.6	0.0	0.0	0.0	0.1	0.0	0.0
South central	8	375.3	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0
Southeast	9	289.5	0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total		1980.0	3.3	3.3	0.0	0.0	0.2	0.2	0.0	0.0
Other Hay[1]										
Northwest	1	146.0	0.8	0.4	0.2	0.2	0.5	0.3	0.1	0.1
North central	2	275.1	9.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0
Northeast	3	100.4	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
West central	4	175.9	0.0	0.7	0.0	0.0	0.0	0.4	0.0	0.0
Central	5	218.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East central	6	55.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southwest	7	129.6	0.5	0.0	0.0	0.0	0.4	0.0	0.0	0.0
South central	8	207.9	0.7	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Southeast	9	221.5	8.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0
Total		1530.0	20.0	1.1	0.2	0.2	1.3	0.0	0.0	0.0
Pasture & Range[1]										
Northwest	1	1314.0	8.8	0.0	0.0	0.0	0.7	0.0	0.0	0.0
North central	2	859.7	10.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0
Northeast	3	384.2	15.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0
West central	4	2165.1	4.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Central	5	1185.5	13.5	0.0	0.0	0.0	1.1	0.0	0.0	0.0
East central	6	330.9	13.8	0.0	0.0	0.0	4.2	0.0	0.0	0.0
Southwest	7	1961.8	81.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0
South central	8	2435.9	18.5	0.0	0.0	0.0	0.8	0.0	0.0	0.0
Southeast	9	1130.5	69.8	0.0	0.0	0.0	6.2	0.0	0.0	0.0
Total		11767.6	235.4	0.0	0.0	0.0	2.0	0.0	0.0	0.0

[1]*Crop reporting districts not listed did not contain significant amounts of the crop.*
[2]*Multiple applications to the same acreage were totaled as one application.*

Table 3. Herbicide usage and application method in wheat, North Dakota, 1978.

Herbicides	Acres of wheat treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Barban	431.4	4.4	0.24	104.0	74	26	20	0	75	4
Bromoxynil	16.9	0.2	0.34	5.7	44	56	56	0	44	0
Bromoxynil + MCPA	16.0	0.2	0.48	7.7	67	33	35	0	65	0
Diallate	11.9	0.1	2.00	23.8	98	2	1	0	98	0
Dicamba	73.3	0.8	0.16	11.5	71	28	10	0	77	12
Dicamba+MCPA	128.6	1.3	0.42	54.1	75	25	13	0	84	3
Diclofop	1.5	<0.1	0.75	1.1	91	9	0	0	76	24
Difenzoquat	41.1	0.4	0.62	25.6	82	18	10	6	81	2
Glyphosate	3.8	<0.1	0.84	3.1	95	5	0	0	100	0
MCPA[2]	362.5	3.7	0.39	144.6	66	34	21	0	77	2
MCPA amine	362.9	3.7	0.42	151.3	84	16	11	0	86	3
MCPA ester	96.9	1.0	0.40	38.6	69	31	15	0	85	0
MCPA total[3]	822.3	8.4	0.41	334.5	73	27	16	0	83	2
Picloram	233.5	2.4	0.02	6.4	68	32	6	0	94	0
Profluralin	4.2	<0.1	1.00	4.2	35	65	0	0	65	35
Propanil	17.4	0.2	1.28	22.3	91	9	0	3	96	1
Triallate	771.1	7.9	1.02	793.4	87	13	1	1	12	85
Trifluralin	387.1	4.0	0.50	196.3	94	6	0	0	11	88
2,4-D[2]	1,025.2	10.5	0.40	418.8	63	37	18	1	75	5
2,4-D amine	3,915.7	40.1	0.40	1,600.4	79	20	10	0	87	3
2,4-D ester	2,430.5	24.9	0.40	972.0	73	27	19	0	77	3
2,4-D total[3]	7,371.4	75.5	0.40	2,991.2	72	28	16	0	80	4
Others[4]	34.8	0.6			46	54	25	4	41	25
All Herbicides	10,366.3	115.6		4,584.9	628	372	20	<1	69	12

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Represents EPTC, unknown, propachlor, chloramben, cyanazine and sodium chlorate.*

Table 4. Insecticide and fungicide usage, and application methods in wheat, North Dakota, 1978.

Pesticides	Acres of wheat treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Insecticides										
Chlordane	2.0	<0.1	1.17	2.4	100	0	0	0	0	100
Malathion	2.5	<0.1	—	—	14	86	86	0	14	0
Methyl parathion	7.8	0.1	—	—	100	0	100	0	0	0
Toxaphene	11.7	0.1	1.50	17.6	51	49	68	0	32	0
Total	24.0	0.4	—	20.0	42	68	75	0	17	8
Fungicides										
Mancozeb	0.5	<0.1	2.4	1.2	0	100	100	0	0	0
Seed Treatments										
Captan 25% + lindane 12.4	2.0	<0.1	—	—	—	—	—	—	—	—
Carboxin or + thiram[3]	36.9	0.4	—	—	93	7	0	0	28	72
Maneb 50% + lindane 18.7	573.9	7.9	0.11	81.7	98	2	5	0	30	65
Maneb 50% + HCB 10%	35.1	0.4	0.13	4.6	94	6	0	0	0	100
Mercury compounds 1.4-7.7%	98.0	1.1	0.13	12.9	4	96	0	0	0	100
TCMTB 3%	16.2	0.2	0.06	.9	100	0	0	0	0	100
Total	762.1	10.1	—	100.0	85	15	4	0	24	72

[1]*Multiple applications to the same acreage were totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*
[3]*Carboxin concentration in commercial formulations varied from 75% when alone to 37.5 or 17% when with thiram at 37.5 or 17%, respectively.*

Table 5. Herbicide usage and application method in barley, North Dakota, 1978.

Herbicides	Acres of barley treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application: Airplane		Method of application: Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	lb/A	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Barban	171.0	6.8	0.27	46.0	65	35	32	1	64	3
Bromoxynil	4.0	0.2	0.19	0.8	46	54	0	0	100	0
Bromoxynil + MCPA	8.5	0.3	0.43	3.6	65	35	31	0	69	0
Diallate	0.7	<0.1	1.00	0.7	65	35	65	0	35	0
Dicamba	11.4	0.5	0.18	2.1	80	20	0	0	100	0
Dicamba + MCPA	3.7	0.1	0.73	2.7	79	21	0	0	100	0
Diclofop	0.2	<0.1	0.94	0.2	100	0	0	0	100	0
Difenzoquat	25.8	1.0	0.62	16.1	84	16	7	1	92	0
Glyphosate	1.0	<0.1	—	—	0	100	0	0	0	100
MCPA[2]	266.1	10.6	0.42	110.9	80	20	11	1	81	7
MCPA amine	230.1	9.2	0.37	85.5	88	12	7	0	90	3
MCPA ester	57.9	2.3	0.38	21.9	74	26	18	0	82	0
MCPA total[3]	554.1	22.1	—	218.0	81	19	12	0	84	3
Propanil	0.6	<0.1	0.75	0.5	100	0	0	0	100	0
Picloram	42.4	1.7	0.03	1.3	86	14	0	0	100	0
Profluralin	1.2	0.1	0.89	1.1	—	—	—	—	—	—
Triallate	195.2	7.8	1.02	198.3	91	9	1	0	7	92
Trifluralin	83.5	3.3	0.57	47.9	97	3	0	0	21	79
2,4-D[2]	246.5	9.9	0.46	114.4	71	29	18	2	72	8
2,4-D amine	821.6	32.9	0.41	337.7	81	19	10	0	85	5
2,4-D ester	400.7	16.0	0.40	159.4	85	15	11	2	85	2
2,4-D total[3]	1468.8	58.8	—	611.0	79	21	13	1	81	5
Others[4]	5.4	0.2	—	—	88	12	0	0	100	0
Total	2577.5	102.8	—	1151.9	91	9	19	<1	75	14

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Represents unknown, metribuzin, chloramben, propanil and sodium chlorate.*

Table 6. Insecticide and fungicide usage and method of application in barley, North Dakota, 1978.

Pesticides	Acres of barley treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application: Airplane		Method of application: Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	lb/A	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Insecticide										
Carbaryl	0.2	<0.1	—	—	0	100	100	0	0	0
Chlordane	2.9	0.1	1.17	3.3	100	0	0	0	0	100
Methyl parathion	1.5	0.1	0.50	0.7	0	100	100	0	0	0
Methyl parathion (encap.)	1.0	<0.1	—	—	0	100	100	0	0	0
Toxaphene	6.9	0.3	<0.1	0.1	13	87	87	0	13	0
Malathion	1.5	0.1	—	—	0	100	100	0	0	0
Total	14.0	0.6	—	4.1	30	71	71	0	7	23
Fungicides										
Mancozeb	<3.4	0.1	4.49	93.0	0	100	100	0	0	0
Seed Treatments										
Carboxin or thiram[3]	18.9	0.8	—	—	83	17	0	0	42	58
Maneb 50% + lindane 18.7%	200.7	8.0	0.34	68.2	100	0	7	0	23	71
Maneb 50% + HCB 10% 1.4-7.7%	8.2	0.3	0.34	2.8	100	0	0	0	0	100
Mercury compounds	12.5	0.5	0.10	1.3	39	61	0	0	0	100
TCMTB	2.7	0.1	—	—	—	—	—	—	—	—
Total	243.0	9.7	—	72.3	94	6	6	0	22	72

[1]*Multiple applications to the same acreage were totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*
[3]*Carboxin concentration in commercial formulations varied from 75% when alone to 37.5 or 17% when with thiram at 37.5 or 17%, respectively.*

Table 7. Pesticide usage and application method in oats, North Dakota, 1978.

Pesticides	Acres of barley treated[1]		Treatment rate	Total lb. a.i.[5]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Herbicides										
Bromoxynil + MCPA	2.2	0.2	0.25	0.5	100	0	0	0	100	0
Dicamba	6.2	0.5	0.11	0.7	89	11	0	0	100	0
Dicamba + MCPA	3.9	0.3	0.47	1.8	41	59	29	0	71	0
MCPA[2]	104.3	7.7	0.37	38.6	71	29	15	0	81	4
MCPA amine	108.4	8.0	0.35	37.5	79	21	5	0	91	4
MCPA ester	17.2	1.3	0.42	7.2	79	21	3	0	97	0
MCPA total[3]	229.9	17.0	—	83.3	76	24	8	0	90	3
Picloram	6.4	0.5	0.01	0.1	56	44	48	0	52	0
2,4-D[2]	35.1	2.6	0.31	10.8	63	37	9	4	87	0
2,4-D amine	192.1	14.2	0.38	72.6	80	20	10	0	87	3
2,4-D ester	44.5	3.3	0.45	19.9	73	27	22	0	76	2
2,4-D total[3]	271.7	7.1	—	103.3	72	28	14	1	83	2
Unknown	3.1	0.2	—	—	0	100	0	0	100	0
Other[4]	7.2	0.6	—	—	71	29	0	0	45	38
Total	530.6	39.4	—	190.0	75	25	13	<1	85	3
Insecticides										
Malathion	1.1	0.1	—	—	0	100	0	0	0	100
Toxaphene	0.6	<0.1	—	—	44	56	100	0	0	0
Total	1.7	0.1	—	—	16	84	35	0	0	65
Fungicides — none										
Seed Treatments										
Maneb 50% + lindane 18.7%	45.2	3.3	0.16	7.0	90	10	0	0	0	100
TCMTB 3% 1.4-7.7%	0.4	<0.1	0.06	0.03	100	0	0	0	0	100
Mercury compound	7.0	0.5	0.1	0.7	54	46	0	0	0	100
Total	52.6	3.8	—	7.7	85	15	0	0	0	100

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Represents barban, EPTC, triallate, glyphosate, chloramben, cyanazine and unknown.*
[5]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 8. Pesticide usage and application methods in flax, North Dakota, 1978.

Pesticides	Acres of flax treated[1]		Treatment rate	Total lb. a.i.[4]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(%)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Herbicides										
Barban	4.5	1.0	0.43	2.0	53	47	13	0	53	33
Bromoxynil	0.3	0.1	0.50	0.1	100	0	0	0	100	0
Dalapon	34.3	7.3	0.71	89.4	46	54	29	1	70	0
Diallate	0.7	0.2	1.59	1.1	100	0	0	0	0	100
Dicamba	4.5	1.1	0.17	0.8	100	0	0	0	100	0
Dicamba + MCPA	4.2	1.0	0.26	1.1	100	0	0	0	91	9
EPTC	38.3	9.0	2.20	85.2	79	21	0	0	27	73
MCPA[2]	58.5	13.8	0.28	16.6	76	24	12	0	83	5
MCPA amine	61.1	14.1	0.29	17.7	83	17	10	1	82	8
MCPA ester	2.9	0.7	0.39	1.1	100	0	0	0	100	0
MCPA total[3]	122.5	28.6	0.30	35.4	86	14	7	<1	88	4
Triallate	16.7	3.9	0.45	7.6	76	24	6	0	74	19
Trifluralin	14.9	3.5	0.35	5.1	63	37	7	7	46	40
2,4-D[2]	1.2	0.3	0.32	0.4	89	11	0	0	100	0
2,4-D amine	5.9	1.4	0.24	1.5	74	26	0	0	100	0
2,4-D ester	4.5	1.1	0.24	1.1	91	9	9	0	85	6
2,4-D total[3]	11.6	2.8	0.20	3.0	85	15	3	0	95	2
Unknown	2.6	0.6	—	—	0	100	24	0	76	0
Total	255.1	59.1	0.53	135.2	74	26	10	1	70	19
Insecticide										
Toxaphene	1.2	0.3	—	—	0	100	60	0	40	0
Total	1.2	0.3	—	—	0	100	60	0	40	0
Seed Treatments										
Maneb 50% + lindane 18.7%	19.0	3.5	—	—	100	0	0	0	0	100
Maneb 50% + HCB 10%	2.1	0.5	—	—	100	0	—	—	—	—
Total	21.1	4.0	—	—	100	0	0	0	0	100

Fungicides — None

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 9. Herbicide usage and application method in corn, North Dakota, 1978.

Herbicides	Acres of corn treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Alachlor	139.1	23.2	1.42	197.6	83	17	1	0	85	14
Atrazine	61.9	10.4	1.51	93.8	78	22	6	0	88	6
Bentazon	1.1	0.2	0.50	0.6	25	75	75	0	25	0
Butylate	2.7	0.5	1.72	4.7	75	25	0	0	25	75
Cyanazine	126.6	21.1	1.27	160.3	76	24	4	0	83	13
Diallate	1.3	0.2	0.38	0.5	100	0	0	0	71	29
Dicamba	26.6	4.4	0.25	6.6	77	23	23	0	77	0
EPTC	0.3	0.1	1.07	0.3	100	0	0	0	0	100
EPTC + R-25788	27.7	4.6	3.45	95.7	93	7	6	0	13	81
Glyphosate	0.3	0.1	1.50	0.5	—	—	—	—	—	—
Linuron	0.2	<0.1	2.00	0.4	100	0	0	0	0	100
Metolachlor	4.8	0.8	1.10	5.3	35	65	65	0	35	0
MCPA ester	5.9	1.0	0.40	2.4	32	68	11	0	89	0
Pendimethalin	5.0	0.8	0.63	3.2	27	73	92	0	8	0
Picloram	0.7	0.1	—	—	0	100	0	0	100	0
Propachlor	0.5	0.1	—	—	100	0	0	0	100	0
Trifluralin	0.4	0.1	—	—	0	100	0	0	100	0
2,4-D[2]	6.2	1.0	—	—	2	98	100	0	0	0
2,4-D amine	18.9	3.2	0.38	7.1	88	12	4	0	94	2
2,4-D ester	6.9	1.1	0.35	2.4	79	21	18	0	82	0
2,4-D total[3]	32.0	5.3	0.36	9.5	69	31	26	0	73	1
Unknown[4]	4.4	0.7	0.44	2.0	8	92	0	0	100	0
Total	441.5	73.6		583.4	77	22	9	0	77	14

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Represents unknown, picloram.*

Table 10. Pesticide usage and application method in corn, North Dakota, 1978.

Pesticides	Acres of corn treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Insecticides										
Carbofuran	12.4	2.1	0.85	10.6	100	0	0	0	14	86
Ethoprop	1.4	0.2	—	—	100	0	—	—	—	—
Fonofos	1.2	0.2	0.60	0.7	100	0	—	—	—	—
Phorate	1.8	0.3	—	—	52	48	0	0	0	100
Toxaphene	3.1	0.5	—	—	100	0	0	0	0	100
Total	19.9	3.3	—	11.3	96	4	0	0	10	90
Fungicides										
Mancozeb	0.4	0.1	1.20	0.5	0	100	100	0	0	0
Total	0.4	0.1	1.20	0.5	0	100	100	0	0	0
Seed Treatments										
Maneb 50% + lindane 18.7%	2.9	0.5	—	—	100	0	—	—	—	—
Captan 25% + lindane 12.4%	10.3	1.8	—	—	94	6	0	0	0	100
Total	13.2	2.3	—	—	95	5	0	0	0	100

[1]*Multiple applications to the same acreage were totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 11. Pesticide usage and application method in sunflowers, North Dakota, 1978.

Herbicides	Acres of sunflowers treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Alachlor	2.7	0.1	1.46	4.0	100	0	0	0	69	31
Barban	4.4	0.2	0.25	1.1	39	61	60	0	32	8
Chloramben	24.4	1.3	0.89	21.6	99	1	0	0	84	16
Cyanazine	0.9	<0.1	—	—	0	100	0	0	0	100
Diallate	1.7	0.1	1.00	1.7	100	0	0	0	0	100
Dinitramine	20.0	1.0	0.48	9.6	88	12	0	0	0	100
EPTC	304.8	15.9	2.52	767.2	99	1	0	0	12	88
Fluchloralin	2.0	0.1	—	—	100	0	0	0	0	100
Glyphosate	3.8	0.2	0.98	3.8	0	100	0	0	100	0
Pendimethalin	0.6	<0.1	1.00	0.6	0	100	100	0	0	0
Profluralin	125.2	6.5	0.78	98.1	72	28	0	0	16	84
Trifluralin	1365.6	71.1	0.80	1088.7	82	18	2	1	15	82
Triallate	53.1	2.8	0.83	44.3	99	1	0	0	15	85
Others[3]	16.4	0.8	0.40	6.6	48	52	10	0	46	44
Total	1925.6	100.1		2047.3	84	16	2	1	16	81
Insecticides										
Methidathion	9.9	0.5	—	—	40	60	60	0	40	0
Methyl parathion	6.8	0.4	—	—	24	76	16	0	36	48
Toxaphene	32.6	1.17	2.21	72.2	61	29	27	5	51	17
Unknown	0.3	<0.1	—	—	0	100	100	0	0	0
Total	49.6	2.7		72.2	51	49	33	3	46	18
Seed Treatments										
Captan 25% + lindane 12.4%	72.6	3.8	0.01	0.73	100	0	0	0	8	92
Maneb 50% + HCB 10%	6.2	0.3	—	—	—	—	—	—	—	—
Maneb 50% + lindane 18.7%	3.8	0.2	0.06	0.27	100	0	—	—	—	—
Total	82.6	4.3		1.00	100	0	0	0	8	92
Other Chemicals										
4-AP	1.5	0.1	—	—	0	100	100	0	0	0
Paraquat[4]	48.7	2.5	0.86	41.8	20	80	42	12	40	6
Sodium chlorate	0.8	<0.1	6.0	5.1	0	100	100	0	0	0
Total	51.0	2.6		46.9	19	81	45	11	38	6

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Compound identity was not given.*
[3]*A composite of the herbicide compounds and value is not included in total for all herbicides.*
[4]*Represents EPTC, unknown, propachlor, chloramben, cyanazine and sodium chlorate.*

Table 12. Herbicide and insecticide usage and application method in potatoes, North Dakota, 1978.

Herbicides	Acres of potatoes treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Diallate	7.0	5.4	1.00	7.0	100	0	0	0	0	100
EPTC	13.1	10.1	3.03	39.7	100	0	0	0	0	100
Linuron	0.3	0.3	2.00	0.7	100	0	0	0	43	57
Metribuzin	0.3	0.3	0.42	0.1	100	0	0	0	100	0
Paraquat	0.1	0.1	0.25	0.1	100	0	0	0	100	0
Trifluralin	2.8	2.1	0.95	2.6	100	0	0	0	100	0
Total	23.6	18.3		50.1	100	0	0	0	14	86
Insecticides										
Aldicarb	9.4	7.2	2.96	27.9	100	0	0	0	0	100
Azinphos-methyl	72.8	56.0	1.49	108.9	97	3	10	2	88	0
Carbaryl	3.8	2.9	—	—	100	0	0	0	100	0
Disulfoton	21.3	16.4	2.39	50.8	100	0	0	0	40	60
Endosulfan	11.1	8.5	2.25	24.9	90	10	58	0	42	0
Methamidophos	0.7	0.6	1.50	1.1	100	0	0	0	100	0
Monocrotophos	15.1	11.6	0.31	4.7	100	0	0	0	100	0
Parathion	0.2	0.1	—	—	100	0	0	0	0	100
Phorate	26.0	20.0	2.24	58.3	98	2	2	0	0	98
Phosphamidon	9.1	7.0	2.46	22.3	71	29	29	0	71	0
Unknown	3.1	2.4	—	—	100	0	0	0	100	0
Total	172.6	132.7		298.9	96	4	10	1	62	27

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*

Table 13. Fungicide and other chemical usage and application method in potatoes, North Dakota, 1978.

Fungicides	Acres of potatoes treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Captafol	5.0	3.9	2.33	11.7	100	0	0	0	100	0
Chlorothalonil	4.2	3.2	0.75	3.2	90	10	10	0	90	0
Mancozeb	38.3	29.4	2.2	84.3	80	20	19	0	80	1
Maneb[2]	3.8	2.9	—	—	100	0	—	—	—	—
Triphenyltin hydroxide	22.9	17.6	0.51	11.7	84	16	21	0	79	0
Zineb	3.0	2.3	—	—	100	0	0	0	100	0
Total	77.2	59.3		110.9	85	15	17	0	82	1
Seed Piece Treatments										
Diazinon 25%, captan 25% and streptomycin sulfate 6.26%	1.5	1.2	—	—	100	0	0	0	0	100
Zineb 8% + streptomycin sulfate 0.01%	2.4	1.8	—	—	100	0	—	—	—	—
Total	3.9	3.0		—	100	0	0	0	0	100
Other Chemicals										
Dinoseb	27.7	21.3	1.91	53.0	30	70	57	0	43	0
30% Maleic hydrazide	27.8	21.4	0.88	24.5	98	2	2	2	96	0
Paraquat	2.1	1.6	—	—	0	100	0	0	100	0
Sulfuric acid	3.8	2.9	—	—	0	100	0	0	100	0
2,4-D ester	6.9	5.3	0.12	0.8	100	0	0	0	0	100
Total	68.3	52.5		78.3	62	38	24	1	65	10

[1]*Multiple applications to the same acreage were totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*

[2]*Was listed as Polyram on the survey.*

Table 14. Pesticide usage and application method in sugarbeets, North Dakota, 1978.

Herbicides	Acres of sugarbeets treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Barban	12.7	8.2	1.20	15.3	88	12	12	0	68	20
Cycloate	6.0	3.8	1.12	6.7	100	0	0	0	0	100
Dalapon	14.5	9.3	2.00	29.0	96	4	4	0	64	32
Desmedipham	30.7	19.7	0.49	15.2	99	1	0	0	93	17
Diallate	48.7	31.2	1.43	69.6	97	3	1	0	3	96
Diethatyl	0.1	0.1	0.60	0.1	100	0	0	0	0	100
EPTC	103.0	65.9	3.38	348.1	91	9	1	4	12	83
Endothall	2.9	1.8	0.50	1.4	72	28	10	12	78	0
Phenmedipham	8.9	5.7	0.53	4.7	100	0	0	0	80	20
Pyrazon	15.7	10.0	2.76	43.3	91	9	0	0	92	8
Triallate	7.1	4.6	1.19	8.5	100	0	0	0	21	79
Trifluralin	1.8	1.1	0.25	0.4	64	36	0	36	64	0
TCA	23.7	15.2	2.94	69.8	79	21	11	1	61	27
2,4-D amine	0.4	0.2	—	—	100	0	0	0	100	0
2,4-D ester	1.6	1.1	—	—	100	0	0	0	100	0
Unknown	0.6	0.4	—	—	100	0	0	0	100	0
Total	285.9	178.3	—	612.1	92	8	2	2	38	58
Insecticides										
Aldicarb	21.9	10.6	2.14	46.8	98	2	0	0	13	87
Carbaryl	0.3	0.2	—	—	0	100	0	0	100	0
Diazinon	2.5	1.6	1.83	4.6	100	0	0	0	0	100
Fonofos	16.5	10.6	1.43	23.6	98	2	0	0	37	63
Phorate	2.8	1.8	—	—	100	0	0	0	100	0
Terbufos	24.6	15.7	1.04	25.6	100	0	0	0	34	66
Toxaphene	0.1	0.1	—	—	100	0	0	0	100	0
Trichlorfon	0.2	0.1	—	—	100	0	0	0	100	0
Total	68.9	40.7	—	100.6	98	2	0	0	30	70
Fungicides										
Benomyl	0.3	0.2	0.19	0.06	0	100	100	0	0	0
Copper hydroxide	1.2	0.8	—	—	0	100	100	0	0	0
Mancozeb	0.7	0.5	1.88	1.4	57	43	43	0	57	0
Thiabendazole	2.7	1.7	0.63	1.7	69	31	31	0	69	0
Triphenyltin hydroxide	8.1	5.2	0.18	1.4	20	80	80	0	20	0
Total	13.0	8.4	—	4.56	30	70	70	0	30	0
Seed Treatments										
Captan 25% + lindane 12.4%	2.4	1.6	—	—	100	0	0	0	0	100
Total	2.4	1.6	—	—	100	0	0	0	0	100

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rates based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 15. Pesticide usage and application method in soybeans, North Dakota, 1978.

Herbicides	Acres of soybeans treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application			
							Airplane		Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Alachlor	7.4	4.2	0.91	6.7	100	0	0	0	79	21
Barban	0.2	0.1	—	—	0	100	0	0	100	0
Bentazon	15.2	8.7	0.65	9.9	47	53	71	0	29	0
Chloramben	12.3	7.0	0.60	7.5	88	12	0	0	75	25
Dinitramine	2.7	1.6	0.49	1.3	100	0	0	0	0	100
EPTC	1.2	0.7	1.80	2.1	100	0	0	0	0	100
Fluchloralin	0.6	0.4	0.75	0.5	100	0	0	0	0	100
Linuron	1.0	0.6	0.83	0.8	100	0	0	0	100	0
Metolachlor	0.1	<0.1	1.50	0.1	0	100	100	0	0	0
Metribuzin	12.4	7.1	0.21	2.6	91	9	0	0	9	91
Pendimethalin	2.2	1.3	1.00	2.2	0	100	19	81	0	0
Profluralin	10.1	5.8	0.90	9.1	83	17	0	26	5	68
Triallate	0.5	0.3	1.00	0.5	100	0	0	0	0	100
Trifluralin	122.7	70.1	0.76	92.9	78	22	6	5	27	62
Total	188.5	107.9	—	136.2	78	22	10	6	29	55
Insecticides										
Malathion	0.8	0.5	—	—	0	100	100	0	0	0
Toxaphene	6.5	3.7	—	—	14	86	86	0	14	0
Unknown	0.8	0.4	—	—	—	—	100	0	0	0
Total	8.1	4.6	—	—	11	89	89	0	11	0
Seed Treatments										
Maneb 50% + lindane 18.7%	3.5	2.0	—	—	100	0	0	0	0	100

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rate based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 16. Pesticide usage and application method in dry beans, North Dakota, 1978.

Herbicides	Acres of dry beans treated[1]		Treatment rate	Total lb. a.i.[2]	Applicator		Method of application: Airplane		Method of application: Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
Alachlor	1.0	0.8	2.00	2.0	100	0	0	0	100	0
Bentazon	0.6	0.5	0.74	0.4	100	0	0	0	100	0
Chloramben	2.3	1.9	0.98	2.2	100	0	0	0	63	37
Diallate	0.1	0.1	0.25	<0.1	100	0	0	0	0	100
Dinitramine	1.7	1.5	0.44	0.8	100	0	0	0	0	100
EPTC	26.9	22.8	2.03	54.6	96	4	0	0	24	76
Linuron	0.1	0.1	—	—	—	—	—	—	—	—
Profluralin	6.2	5.2	0.60	3.7	100	0	0	0	0	100
Triallate	2.2	1.9	0.93	2.1	100	0	0	0	0	100
Trifluralin	73.7	62.4	0.72	53.4	93	7	3	0	16	81
2,4-D amine	0.1	0.1	—	—	0	0	0	0	0	0
Total	114.9	97.3		119.2	95	5	2	0	19	79
Insecticides										
Toxaphene	0.4	0.3	—	—	0	100	100	0	0	0
Unknown	0.2	0.2	—	—	0	100	100	0	0	0
Total	0.6	0.5	—	—	0	100	100	0	0	0
Fungicides										
Benomyl	1.4	1.2	1.00	1.4	0	100	100	0	0	0
Copper Hydroxide	1.7	1.5	—	—	0	100	100	0	0	0
Mancozeb	3.0	2.6	2.80	8.4	0	100	100	0	0	0
Maneb	11.3	9.5	2.09	21.9	0	100	100	0	0	0
Total	17.4	14.8	—	31.7	0	100	100	0	0	0
Seed Treatments										
Captan 25% + lindane 12.4%	0.2	0.2	0.02	<0.1	100	0	0	0	100	0
Maneb 7.5%	1.6	1.4	—	—	0	100	100	0	0	0
Zineb 8%	0.4	0.3	—	—	0	100	100	0	0	0
Total	2.2	1.9	—	<0.1	9	91	91	0	9	0

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*
[2]*Seed treatment rate based on product not active ingredient. Acres is the area seeded with the treated seed.*

Table 17. Pesticide usage and application method in alfalfa, North Dakota, 1978.

Herbicides	Acres of Alfalfa treated[1]		Treatment rate	Total lb. a.i.	Applicator		Method of application: Airplane		Method of application: Ground	
					Self	Custom	Surface	Incorp.	Surface	Incorp.
	(1000)	(%)	(lb/A)	(1000)	(%)	(%)	(%)	(%)	(%)	(%)
EPTC	2.8	0.1	1.00	2.8	0	100	0	0	0	100
MCPA	0.1	<0.1	—	—	100	0	0	0	100	0
Picloram	<0.1	<0.1	1.50	0.1	100	0	0	0	100	0
2,4-D	0.5	<0.1	—	—	100	0	0	0	100	0
Total	3.4	0.1		2.9	18	82	0	0	18	82
Insecticides										
Carbaryl	0.3	<0.1	—	—	0	100	100	0	0	0
Malathion	0.4	<0.1	—	—	100	0	0	0	100	0
Parathion	1.0	0.1	—	—	0	100	100	0	0	0
Toxaphene	1.2	0.1	—	—	100	0	57	0	43	0
Unknown	1.5	0.1	—	—	0	100	100	0	0	0
Total	4.4	0.2		—	36	64	79	0	21	0

[1]*Herbicides applied as a tank mixture were considered separately unless a commercial premix was used. Each application to the same acreage was totaled the same as individual applications to separate acreages. Thus acres treated can exceed 100% of planted acres.*