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United States and Canadian Agricultural Herbicide Costs: 2003 Update

Richard D.Taylor
*James A. Gray**

ABSTRACT

Herbicide prices differ between Canada and the United States. Price disparities may be symptoms of the different pesticide regulatory systems between the two countries. The price diferences may be due to the size of the respective pesticide markets or different business environments. Traditional economic theory states that price is determined by supply and demand. For the prices to remain different, the two markets must be segregated by some barrier. If not, arbitrage will occur and eliminate the price differences. An international border with trade restriction provides an excellent barrier. The price difference between the two countries costs North Dakota producers over $20 million annually. Higher herbicide costs in North Dakota raised total pesticide expenditures about 8.3% and total crop expenses by 2.3% in 2002. Differences in the economic structure of the two countries provide the incentive for different prices, but market segregation is required for successful price discrimination. Therefore, to eliminate price disparities, the U.S. and Canadian herbicides markets must be de-segmented.

INTRODUCTION

The purpose of this paper is to estimate the cost differences which exist between Canadian and U.S. herbicides. The controversy between the United States and Canada over herbicide pricing began in late 1997 when it became apparent that some herbicides were substantially lower priced in Canada than in the United States. Also, several herbicides that were labeled in Canada were unavailable for use in the United States. There are several possible explanations for the differences, with varying explanations from the chemical industry, state government, political leaders, and farm organizations.

Some members of the pesticide industry contend that current U.S./Canadian pesticide price disparities are simply a symptom of the different pesticide regulatory systems that exist between the two countries. However, the U.S. Environmental Protection Agency (EPA) and Canada's Pest Management Regulatory Agency (PMRA) have been working for several years to harmonize their pesticide regulatory programs and registration processes, and feedback from both Agencies suggests that data requirements to support pesticide registrations have been largely harmonized. Therefore, the extent to which regulatory factors contribute to pesticide price disparities could be insignificant.

**Research Scientist at the Center for Agricultural Policy and Trade Studies, and Pesticide Registration Coordinator for the ND Department of Agriculture, respectively.*

Another rationale for higher pesticide prices relative to fixed costs is the size of the respective markets. For example, the Canadian spring grown cereal market is roughly twice as large as the U.S. market, and the Canadian canola market is approximately 7 times larger than the canola market in the U.S. Presence of competing pesticides in a given market can also have a significant effect on prices. For example, Canadian cereal producers have a larger selection of herbicides than their U.S. counterparts, thus increasing herbicide price competition in Canada. Similarly, herbicide price competition benefits U.S. corn and soybean producers.

In addition, feedback from the pesticide industry suggests that the business environment is generally more litigious in the United States than in Canada, and this can add significantly to the cost of doing business in the United States. Some contend that the higher pesticide prices paid by U.S. farmers is a symptom of the greater liability faced by pesticide companies that market their products in the United States.

This report updates a previous study titled, "United States and Canadian Agricultural Herbicide Costs: Impacts on North Dakota Farmers." During the past several years there have been changes in the pricing structure of herbicides in both Canada and the United States, but have those changes narrowed the cost differences?

Herbicide Uses and Price

Traditional economic theory states that price is determined by supply and demand. Supply is a function of product price, resource prices, the technique of production, taxes and subsidies, prices of other goods, price expectations, and number of sellers in the market. Demand is a function of product price, tastes and preferences of consumers, number of consumers in the market, income of consumers, prices of related goods, and consumer expectations with respect to future prices and incomes (McConnell). Price is determined by the intersection of the downward sloping demand curve and the upward sloping supply curve. Since the price of herbicides varies between Canada and the United States, the demand and/or supply curves in the two countries differ. Figure 1 shows the direct effect of different demand curves on price. If the United States has a demand curve represented by D_1, and Canada has a demand curve represented by D_2, then the price in the United States will be higher (P_1) than the price in Canada (P_2).

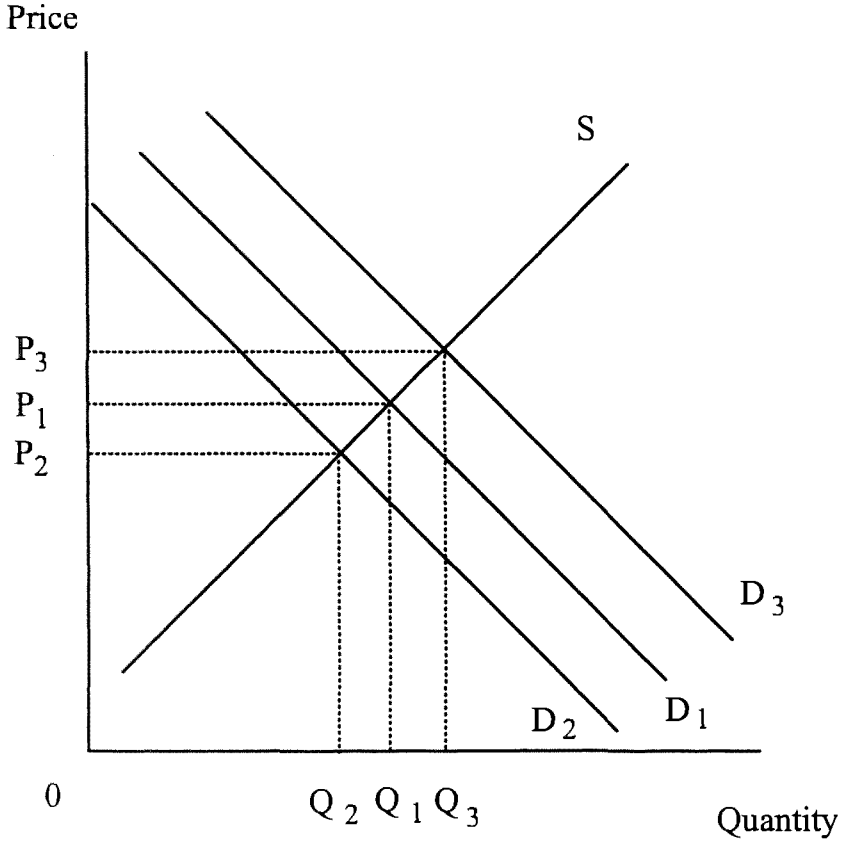

Figure 1. Price Determination of Different Demand Curves

On the other hand, if Canada has a demand curve D_3,then the Canadian price will be at P_3. Any changes in the determinants of demand will shift the demand curve in the market. Different supply curves will also change prices, but since most chemical companies are multi-nationals, the supply curve in the two countries should be similar except for costs involved in registration differences and availability of competing products.

There are substantial differences in economic conditions, however, between the two countries. Canada has a higher federal tax rate and a slightly lower standard of living, which may affect the cost of doing business in Canada. Canadian agricultural subsidies are lower than U.S. subsidies, which may provide lower net farm incomes to Canadian producers. Government payments in the United States increase U.S. farm income and affect the demand for farm inputs. Some of the difference in income between the two countries may be offset by payments from the Canadian Wheat Board, but the income gap traditionally favors the United States. With the higher net farm income, one of the determinants of demand, the related demand curve will shift to the right, which will increase prices of all inputs, not just herbicides. U.S. land prices are the most obvious example. Past, present, and future government payments are capitalized into the price of farmland in the United States, and it is not unreasonable to expect the same to occur with other farm inputs. However, for those difference to persist, the two markets must be segregated by some barrier. An international border with trade restrictions on chemicals provides an excellent barrier.

U.S./Canadian herbicides used in the pricing comparisons are those with similar formulations which contain the same percentage of active ingredient(s) and are being sold by the same manufacturer and registered for similar uses in the U.S. and Canada. All prices are based on the same rate of active ingredient per acre, using Canadian use rate recommendations (Appendix Table 1). Canadian prices were converted to U.S. dollars using the average currency exchange rates for a given year as obtained from an internet exchange rate website (www.x-rates.com). Average currency exchange rates for a given year were obtained by taking the mean of the 12 monthly averages. Canadian dollars were converted to U.S. dollars using currency exchanges of 0.67341, 0.64577, and 0.63686 for 2000, 2001, and 2002, respectively.

U.S. herbicide prices were obtained from the North Dakota Weed Control Guides for 2001, 2002 and 2003, respectively. The North Dakota Weed Control Guides are published annually by the North Dakota State University Extension Service, and prices are based on cash-and-carry retail price estimates provided by the major pesticide suppliers in the state. Pesticide prices published in each edition are based on retail prices from the previous year. For example, prices published in the 2001 North Dakota Weed Control Guide are based on year 2000 retail prices.

Saskatchewan herbicide prices for 2000, 2001, and 2002 were obtained from the Guides to Crop Protection for 2001, 2002, and 2003, published by Saskatchewan Agriculture and Food. As with the North Dakota Weed Control Guides, prices published in each Guide to Crop Protection are based on retail prices from the previous year. Manitoba herbicide prices for 2002 were obtained from the Guide to Crop Protection 2003, published by Manitoba Agriculture and Food.

Estimates of the number of North Dakota acres treated with a given herbicide were obtained from Pesticide Use and Pest Management Practices for Major Crops in North Dakota - 2000, a grower survey conducted by the North Dakota State University Extension Service.

The authors acknowledge that cropping patterns have changed since 2000. The number of acres

of all wheat grown in North Dakota decreased from 10.17 million acres in 2000 to 9.08 million acres in 2002 (North Dakota Agricultural Statistics Service). Plantings of barley also decreased from 1.9 million to 1.6 million acres. The planted acres of corn and soybeans have increased since 2000; all corn acres increased from 1.08 million in 2000 to 1.23 million acres in 2002, and soybean plantings increased from 1.9 million to 2.67 million acres. Other crop production has remained somewhat constant. The shift in planted acres will change herbicide use slightly. For example, under these conditions, less herbicide would be used on small grains statewide and more would be used on row-crops. In addition, the increased plantings of glyphosate-tolerant soybeans would decrease the use of traditional soybean herbicides and increase the use of glyphosate. However, since 2000 was the last year that the survey was conducted, those estimates of glyphosate-treated acres were used in this study. The total cost of each pesticide price difference to North Dakota was obtained by multiplying the price difference per acre by the number of treated acres.

Differences in Herbicide Costs

Table 1 shows the per acre herbicide costs for chemicals used in both Canada and the United States. The first column lists the trade names in the United States. The next two columns list the per acre costs for both countries as they were listed in the previous study. The next columns list the per acre costs for Saskatchewan and the United States for the years 2000, 2001, and 2002. For 2002, a list of per acre costs for Manitoba is also included. The table shows that there has been some price movement over time, both positive and negative. Atrazine has increased in cost in Saskatchewan and decreased in cost in the United States. Basagran has decreased in cost in Saskatchewan and increased in cost in the United States. Puma, Dual, and Liberty have decreased in cost in both countries. Costs of glyphosate products (Roundup, Glyfos, Glyphomax) and Far-Go decreased in Saskatchewan and were unchanged in the United States.

The per acre herbicide cost differences between Canada and the United States are shown in Table 2. Positive numbers indicate higher costs in the United States. The per acre cost differences increased for Basagran, Discover, Eptam, Eradicane, Dual, and Far-Go, while the cost differences narrowed for Liberty, Assert, and Achieve. The differences for several herbicides which cost less in the United States have narrowed during the last few years. The cost advantages for Muster, Assure and Poast have dwindled since 2000.

Table 3 shows the changes in per acre cost differences for the 20 most popular herbicides. Negative numbers in the last column indicate a narrowing of the cost difference between Canada and the United States. The largest changes were in the price relationships of Liberty, Achieve, and Assert ($5.03, $3.53, $2.33, respectively). The herbicides still cost more in the United States, but the gap is narrowing. Minor changes occurred in Puma, Far-Go, Escort, Sonalan, and Banvel ($0.53, $0.32, $0.19, $0.13, and $0.12, respectively). Puma and Far-Go cost more in the United States, and Escort, Sonalan, and Banvel cost more in Canada.

Table 4 shows the total cost difference by herbicide between North Dakota and selected Canadian locations. The largest cost difference is for Puma. Puma was used on 2.8 million acres in North Dakota, and in 2000, North Dakota producers paid $12.8 million more for Puma than did similar producers in Saskatchewan. The price difference has narrowed somewhat, but in 2002, the cost difference was still between $11.3 and $11.4 million. The next highest cost was for herbicides containing glyphosate. Glyphosate (Roundup, Glyfos, Glyphomax) was used on 2.3 million acres. The difference narrowed from $3.9 million in 2000 to $3.7 million in 2002. Bromac was used on 1.8 million acres in North Dakota, and the cost difference was between $2.2 million and $2.1

million.

Several chemicals are lower-priced in the United States than in Canada. However, Canadian producers have a program called the Own-Use Import Permit which allows them to access lower-priced U.S. herbicides for their own use. The United States does not have a similar program to obtain lower-priced Canadian pesticides.

The net cost difference between U.S. and Canadian herbicides has narrowed in the past several years. The net difference was $17.8 million in 2000, $15.2 million in 2001, and $14.8 million in 2002 based on Saskatchewan prices, and $13.1 million in 2002 based on Manitoba prices. If only the herbicides which cost more in the United States are considered ("Total Postive in Table 4), the cost difference is higher, but that gap has also decreased.

Conclusion

The controversy between U.S. and Canadian chemical prices is over 6 years old. With the exception of a few herbicides, very little has changed. The price differences of Liberty, Achieve, Assert, and Puma have narrowed during the last 3 years; however, cost difference for several herbicides have widened during the same period. The price differences for Discover, Basagran, and Curtail are wider now than in 2000. Basagran, which was lower-priced in 2000, is now higher-priced in the United States than in Canada.

The overall cost difference in 2002 is about $1.56 per acre, but producers who use Liberty, Puma, Far-Go, or Assert are disadvantaged by more than $3.00 per acre. Producers in certain areas and producers of certain crop mixes face a much higher cost disadvantage.

Whether the situation is due to market manipulation or economic factors is undetermined, but the cost difference exists and it costs N.D. farmers over $20 million annually. According to NASS, total pesticide expenditures in North Dakota in 2001 (last year published) were $261 million. Higher herbicide costs in North Dakota compared to Canada raised total pesticide expenditures about 8.3% and total crop expenses by 2.3%.

Markets must be segregated if different prices are to charged for herbicides. The international border and trade restrictions provide the necessary segregation. Differences in the economic structure of the two countries provide the incentive for different prices, but market segregation is required for successful price discrimination. Therefore, to eliminate price disparities, the U.S. and Canadian herbicides markets must be de-segmented.

Table 1. Per Acre Costs for Herbicides Used in Canada and the United States

	1999a		2000b		2001b		2002b		
	Can.	U.S.	Sas.	U.S.	Sas.	U.S.	Sas.	Man.	U.S.
Product	US$								
Atrazine 4L	2.53	2.65	3.34	3.15	3.21	2.70	3.52	3.52	2.48
Atrazine 90DF	2.53	2.65	3.34	3.15	3.21	2.53	3.17	3.17	2.50
Basagran	12.77	13.50	17.80	17.37	17.13	18.83	17.06	17.06	18.82
Bromac			4.30	5.50	4.24	5.50	4.32	4.32	5.50
Buctril			6.48	8.25	6.47	8.25	6.51	6.51	8.55
Select			21.21	6.97	20.34	7.40	20.54	20.54	7.37
Discover			10.92	12.75	10.77	15.25	10.92	10.92	15.25
Stinger	16.05	24.00	21.23	30.00	20.70	30.00	20.65	20.65	30.00
Curtail M			7.74	9.00	7.46	9.00	6.91	6.91	9.40
Banvel			2.81	2.75	2.71	2.76	2.94	2.94	2.76
Avenge			11.30	11.90	10.95	12.50	11.03	11.03	10.00
Eptam EC	19.57	20.30	12.44	13.56	11.93	13.47	12.41	12.41	14.00
Eradicane EC			15.31	16.00	14.68	16.00	13.78	13.78	16.00
Sonalan 10G	8.59	9.18	11.99	9.21	11.73	9.23	11.73	11.66	8.82
Muster			16.09	11.35	15.45	11.35	15.21	15.21	11.75
Puma	6.04	9.00	10.44	15.00	10.24	14.10	9.76	9.73	13.80
Everest			9.93	12.00	9.53	12.00	9.58	9.58	12.00
Reflex			NA	5.13	4.46	5.00	4.48	4.48	5.00
Liberty	12.21	21.85	12.42	21.85	9.73	18.70	9.60	9.60	14.00
Glyphosate	4.07	6.90	3.02	4.68	2.89	4.68	2.85	2.85	4.68
Roundup Ultra			3.30	5.23	3.16	5.03	3.12	3.12	4.99
Glyphomax			3.02	4.50	2.89	4.25	2.85	2.85	4.25
Glyphomax Plus			3.30	5.23	3.16	4.95	3.12	3.12	4.95
Assert 2.5S	4.16	7.50	8.22	13.75	8.10	11.69	8.48	8.48	11.69
Dual Magnum	14.19	21.90	20.22	19.69	16.16	18.59	15.93	15.93	18.75
Escort			14.14	10.50	12.09	8.49	12.23	12.23	8.40
Accent			15.58	15.50	15.23	16.00	15.33	15.33	16.00
Assure II			11.11	8.69	15.98	9.03	10.51	15.76	9.03
Matrix			11.78	12.75	11.53	10.63	11.92	11.92	10.63
Poast	7.43	8.15	10.33	8.15	9.87	8.15	9.92	10.11	8.15
Harmony GT	3.66	3.15	3.79	3.60	3.71	3.60	3.77	3.77	3.60
Achieve 40DG			10.61	16.10	10.17	14.00	10.29	10.29	12.25
Far-Go EC	5.55	10.00	7.28	12.50	6.94	12.50	7.08	7.08	12.50
Far-Go 10G			9.66	11.53	9.27	11.50	9.43	9.25	11.90
Garlon EC			32.27	42.50	30.22	42.48	28.53	28.53	42.50

a: From United States and Canadian Agricultural Herbicide Costs: Impacts on North Dakota Farmers

b: Saskatchewan Agriculture and Food and Manitoba Agriculture and Food

Table 2. Herbicide Cost Difference Between the United States and Canada[a]

	Study	Saskatchewan			Manitoba
U.S. Product Name	1999	2000	2001	2002	2002
	U.S.$/acre				
Atrazine 4L	0.12	-0.19	-0.51	-1.04	-1.04
Atrazine 90DF	0.12	-0.19	-0.68	-0.67	-0.67
Basagran	0.73	-0.43	1.70	1.76	1.76
Bromac		1.20	1.26	1.18	1.18
Buctril		1.77	1.78	2.04	2.04
Select		-14.24	-12.94	-13.17	-13.17
Discover		1.83	4.48	4.33	4.33
Stinger	7.95	8.77	9.30	9.35	9.35
Curtail M		1.26	1.54	2.49	2.49
Banvel		-0.06	0.05	-0.18	-0.18
Avenge		0.60	1.55	-1.03	-1.03
Eptam EC	0.73	1.12	1.54	1.59	1.59
Eradicane EC		0.69	1.32	2.22	2.22
Sonalan 10G	0.59	-2.78	-2.50	-2.91	-2.84
Muster		-4.74	-4.10	-3.46	-3.46
Puma	2.96	4.56	3.86	4.04	4.07
Everest		2.07	2.47	2.42	2.42
Reflex			0.54	0.52	0.52
Liberty	9.64	9.43	8.97	4.40	4.40
Glyphosate	2.83	1.66	1.79	1.83	1.83
Roundup Ultra		1.93	1.87	1.87	1.87
Glyphomax		1.48	1.36	1.40	1.40
Glyphomax Plus		1.93	1.79	1.83	1.83
Assert 2.5S	3.34	5.53	3.59	3.21	3.21
Dual Magnum	7.71	-0.53	2.43	2.82	2.82
Escort		-3.64	-3.60	-3.83	-3.83
Accent		-0.08	0.77	0.67	0.67
Assure II		-2.42	-6.95	-1.48	-6.73
Matrix		0.97	-0.90	-1.29	-1.29
Poast	0.72	-2.18	-1.72	-1.77	-1.96
Harmony GT	-0.51	-0.19	-0.11	-0.17	-0.17
Achieve 40DG		5.49	3.83	1.96	1.96
Far-Go EC	4.45	5.22	5.56	5.42	5.42
Far-Go 10G		1.87	2.23	2.47	2.65
Garlon EC		10.23	12.26	13.97	13.97

a:A positive number indicates higher cost in the United States

Table 3. Changes in Cost Differences Between Saskatchewan and North Dakota, 2000 and 2002

	Per acre cost difference			
U.S. Product Name	2000	2001	2002	Difference[a] 2000 and 2002
	US$			
Puma	4.56	3.86	4.04	-0.53
Banvel	-0.06	0.05	-0.18	0.12
Glyphosate	1.75	1.76	1.65	-0.10
Bromac	1.20	1.26	1.18	-0.02
Sonalan 10G	-2.78	-2.50	-2.91	0.13
Poast	-2.18	-1.72	-1.77	-0.41
Assure II	-2.42	-6.95	-1.48	-0.94
Basagran	-0.43	1.70	1.76	2.20
Harmony GT	-0.19	-0.11	-0.17	-0.02
Assert 2.5S	5.53	3.59	3.21	-2.33
Accent	-0.08	0.77	0.67	0.75
Achieve 40DG	5.49	3.83	1.96	-3.53
Atrazine	-0.19	-0.54	-0.94	0.75
Buctril	1.77	1.78	2.04	0.27
Far-Go	4.05	4.05	3.74	-0.32
Liberty	9.43	8.97	4.40	-5.03
Escort	-3.64	-3.60	-3.83	0.19
Select	-14.24	-12.94	-13.17	-1.07
Discover	1.83	4.48	4.33	2.50
Curtail M	1.26	1.54	2.49	1.23

a: A negative number indicates a narrowing of the cost difference between Canada and the United States

Table 4. Total Cost Difference by Herbicide Between North Dakota and Selected Canadian Locations

			Additional Cost Paid by ND Producers US$ Compared to			
			Saskatchewan			Manitoba
U.S. Product Name	ND Treated Acres (000)	Previous Study 1999	2000	2001	2002	2002
Puma	2,803.6		12,790,430	10,834,640	11,317,954	11,407,229
Banvel	2,520.0		-163,432	136,644	-459,379	-443,330
Glyphosate	2,255.3		3,946,775	3,963,690	3,726,883	3,726,883
Bromac	1,757.6		2,115,525	2,221,165	2,077,640	2,077,640
Sonalan 10G	961.6		-2,670,073	-2,401,291	-2,799,180	-2,731,816
Poast	594.2		-1,295,421	-1,024,296	-1,053,088	-1,166,615
Assure II	450.7		-1,091,264	-3,133,630	-669,091	-3,034,241
Basagran	403.2		-175,376	687,125	711,603	711,603
Harmony GT	348.9		-66,744	-37,235	-59,387	-59,387
Assert 2.5S	323.8		1,792,038	1,163,104	1,038,435	1,038,435
Accent	286.6		-23,704	219,617	192,245	192,245
Achieve 40DG	280.4		1,540,459	1,073,686	550,905	550,905
Atrazine	139.4		-26,486	-74,579	-131,036	-131,036
Buctril	139.2		246,634	247,690	284,148	284,148
Reflex	134.1		NA	72,975	69,263	69,263
Far-Go EC	119.2		482,760	482,760	445,212	445,212
Liberty	111.6		1,052,647	1,000,856	491,321	491,321
Escort	90.1		-328,109	-324,253	-344,877	-344,877
Select	81.9		-1,166,454	-1,059,930	-1,078,519	-1,078,519
Discover	72.3		132,600	323,800	313,364	313,364
Curtail M	70.8		88,910	109,128	176,297	176,297
Stinger	63.2		554,524	587,954	590,707	590,707
Avenge	30.6		18,366	47,361	-31,531	-31,531
Eradicane EC	19.2		13,184	25,252	42,715	42,715
Eptam EC	16.5		18,404	25,347	26,195	26,300
Dual Magnum	14.5		-7,721	35,276	40,829	40,829
Net			17,778,471	15,202,856	15,469,629	13,163,746
Total Positive		23,935,603	24,238,731	23,258,070	22,036,330	21,594,390

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Appendix Table 1. Herbicide Trade Names in Canada and the United States

		Canadian				U.S.		
Product	Active Ingredient	Formulation	Prod. Rate	g ai/A	Product	Formulation	Prod. Rate	g ai/A
Aatrex 4L	atrazine	480 g/L	0.85 L/A	408	Atrazine 4L, Aatrex 4L	4 L	1.8 pt/A	408
Atrazine Nine-O	atrazine	90% ai	0.45 kg/A	405	Atrazine 90DF, Aatrex Nine-O	90 DF	1 lb/A	408
Basagran	bentazon	480 g/L	0.91 L/A	437	Basagran	4 SL	1.93 pt/A	437
Buctril M	bromoxynil + MCPA	280 g/L (each)	0.405 L/A	113.4	Bromac, Bronate	2 EC	1 pt/A	113.4
Pardner	bromoxynil	280 g/L	.485 L/A	136	Buctril	2 EC	1.2 pt/A	136
Select	clethodim	240 g/L	.15 L/A	36	Select	2 EC	5.1 fl oz/A	36
Horizon	clodinafop-propargyl	240 g/L (EC)	0.095 L/A	23	Discover	2 EC	3.2 fl oz/A	23
Lontrel	clopyralid	360 g/L	.23 L/A	83	Stinger	3 SC	0.5 pt/A	83
Curtail M	clopyralid + MCPA	50 gL clo/280 g/L MCPA	0.8 L/A	40/224	Curtail M	0.42 + 2.35 SL	1.75 pt/A	40/224
Banvel II	dicamba	480 g/L	0.127 L/A	61	Banvel	4 SL	4.3 fl oz/A	61
Avenge 200C	difenzoquat	200 g/L	1.42 L/A	284	Avenge	2 SL	2.5 pt/A	284
Eptam 8-E	EPTC	800 g/L	1.72 L/A	1376	Eptam EC	7 EC	3.5 pt/A	1376
Eradicane 8-E	EPTC	800 g/L	2.23 L/A	1784	Eradicane EC	6.7 EC	4.75 pt/A	1784
Edge	ethalfluralin	5% ai	8.9 kg/A	445	Sonalan 10G	10G	9.8 lb/A	445
Muster Toss-N-Go	ethametsulfuron-methyl	75% ai	12 g/A	9	Muster	75 DF	0.42 oz/A	9
Puma Super	fenoxaprop-p-ethyl	92 g/L	0.405 L/A	37	Puma	1 EC	0.67 pt/A	37
Everest	flucarbazone	70% ai	17.4 g/A	12.18	Everest	70 WDG	0.6 oz/A	12.18
Reflex	fomesafen	240 g/L	0.23 L/A	55.2	Reflex	2 EC	0.5 pt/A	55.2
Liberty	glufosinate	150 g/L (EC)	1.1 L/A	165	Liberty	1.67 SL	28 fl oz/A	165
Glyfos	glyphosate	360 g ae/L	0.5 L/A	180	Glyfos	3 SL	1.1 pt/A	180
Roundup Transorb	glyphosate	360 g ae/L	0.5 L/A	180	Roundup Ultra	3 SL	1.1 pt/A	180
Vantage	glyphosate	356 g ae/L	0.5 L/A	178	Glyphomax	3 SL	1.0 pt/A	178
Vantage Plus	glyphosate	360 g ae/L	0.5 L/A	180	Glyphomax Plus	3 SL	1.1 pt/A	180
Assert 300SC	imazmethabenz	300 g/L	0.54 L/A	162	Assert 2.5S	2.5 S	1.1 pt/A	162
Dual II Magnum	metolachlor	915. g/L	0.7 L/A	641	Dual Magnum	7.62 EC	1.5 pt/A	641
Escort	metsulfuron	60% ai	12 g/A	7.2	Escort	60 DF	0.42 oz/A	7.2
Accent	nicosulfuron	75% ai	13.5g/A	10.1	Accent	75 DF	0.5 oz/A	10.1
Assure II	quizaolofop-p-ethyl	96 g/L	0.3 L/A	27.6	Assure II	0.88 EC	8.9 fl oz/A	27.6
Prism	rimsulfuron	25% ai	24 g/A	6	Matrix	25 DF	.85 oz/A	6
Poast Ultra	sethoxydim	450 g/L	0.19 L/A	85.5	Poast	1.5 EC	1 pt/A	85.5
Refine Toss-N-Go	thifensulfuron + tribenuron	50% thif/25% trib.	8 g/A	4/2	Harmony GT	50 + 25 DF	.3 oz/A	4/2
Achieve 80DG	tralkoxydim	80% ai	0.1 kg/A	80	Achieve 40DG	40% ai	7 oz/A	80
Avadex BW	triallate	400 g/L	1.42 L/A	568	Far-Go EC	4 EC	2.5 pt/A	568
Avadex BW	triallate	10% ai	5.67 kg/A	567	Far-Go 10G	10 G	12.53 lb/A	567
Remedy EC	triclopyr	480 g/L	1.6 L/A	768	Garlon EC	4 EC	1.7 qt/A	768

North Dakota State University
Dept. of Agribusiness & Applied Economics
P.O. Box 5636
Fargo, ND 58105-5636

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