

## 2009 North Dakota Herbicide Compendium

The listings are approximate retail prices for small quantities. Herbicide prices do not include cost of such additives as surfactants, oils, fertilizer or application costs. Prices may vary depending on area of the state, wholesaler, bulk discounts, seasonal changes, quantities purchased and particular programs the manufacturing company offers. Prices are averages based on statewide dealer survey for small quantities. Producers should consult local agricultural product suppliers for exact price of each product in their area.

Product	Active Ingredients	Formulation	Cost \$/Unit	Product/A			Cost \$/A		
				Low	Med	High	Low	Med	High
Aatrex 4L Syngenta	atrazine	4F	24.00 gal	0.75 pt	1.5 pt	2 pt	2.25	4.50	6.00
Atrazine Nine-O "	atrazine	90DF	4.50 lb	0.42 lb	0.83 lb	1.11 lb	2.40	4.75	6.35
Accent Dupont	nicosulfuron	75DF	40.00 oz	0.33 oz	0.5 oz	0.67 oz	13.20	20.00	26.40
Accent Q Dupont	nicosulfuron + isoxadifen safener	54.5DF	- oz	0.67 oz	1.25 oz	1.8 oz	-	-	-
Acclaim Extra Bayer	fenoxaprop-P	0.57EC	525.00 gal	13 fl oz	20 fl oz	28 fl oz	53.35	82.05	114.85
Accurate Cheminova	metsulfuron-methyl	60DF	7.50 oz	0.05 oz	0.1 oz	0.3 oz	0.35	0.75	2.25
Accurate Extra "	thifensulf & triben & metsulfuron	37.50 + 18.75 +15DF	5.00 oz	10 A/pk	-	5 A/pk	1.00	-	2.00
Achieve Liquid Syngenta	tralkoxydim & oil adjuvant	3.33 SC	575.00 case	-	6.9 fl oz	-	-	13.90	-
Acumen Tenkoz	pendimethalin	3.3EC	30.00 gal	2.4 pt	3 pt	3.64 pt	9.00	11.25	13.65
Affinity BroadSpec Dupont	thifensulfuron & tribenuron	25 + 25SG	11.00 oz	0.4 oz	0.6 oz	1 oz	4.40	6.60	11.00
Affinity TankMix Dupont	thifensulfuron & tribenuron	40 + 10SG	8.00 oz	0.6 oz	0.75 oz	1 oz	4.80	6.00	8.00
Agility Dupont	dicamba&thifen& triben&metsulf	57.8+4.7+2.4+1.9SG	2.50 oz	1.6 oz	2.4 oz	3.2 oz	4.00	6.00	8.00
Aim EC FMC	carfentrazone-ethyl	2EC	210.00 qt	1/2 fl oz	-	1 fl oz	3.30	-	6.55
Alachlor Microflo	alachlor	4EC	25.00 oz	2 qt	2.5 qt	3 qt	12.50	15.65	18.75
Ally Dupont	metsulfuron-methyl	60XP	14.00 oz	0.05 oz	0.1 oz	0.3 oz	0.70	1.40	4.20
Ally Extra Dupont	thifensulfurn&tribenrn&metsulfurn	37.50 + 18.75 +15DF	11.00 oz	10 A/pk	-	5 A/pk	2.20	-	4.40
Ally Extra SG Dupont	thifensulfurn&tribenrn&metsulfurn	27.3 + 13.6 +10.9SG	11.00 oz	0.3 oz	-	0.5 oz	3.30	-	5.50
Alphanex UPI	desmedipham	1.3EC	80.00 gal	4.62 pt	6 pt	7.7 pt	46.20	60.00	77.00
Amber Syngenta	triasulfuron	75DF	11.00 oz	0.14 oz	0.28 oz	0.56 oz	1.55	3.10	6.15
Aquathol Super K	endothall	45G	- lb	8.8 lb	13.2 lb	22 lb	-	-	-
Arrow MANA	clethodim	2EC	125.00 gal	4 fl oz	6 fl oz	8 fl oz	3.90	5.85	7.30
ArsenalPowerline BASF	imazapyr-ipa salt	2AE	2.50 gal	1 qt	2 qt	3 qt	62.50	125.00	187.50
Assert Nufarm	imazamethabenz-methyl	2.5SL	95.00 gal	0.6 pt	1 pt	1.2 pt	7.15	11.90	14.25
Assure II Dupont	quizalofop-ethyl	0.88EC	145.00 gal	4 fl oz	8 fl oz	10 fl oz	4.55	9.10	11.35
Atrazine 4L Several	atrazine	4F	19.00 gal	0.75 pt	1.5 pt	2 pt	1.80	3.55	4.75
Atrazine 90DF Several	atrazine	90DF	4.50 lb	0.42 lb	0.83 lb	1.11 lb	1.90	3.75	5.00
Audit Arysta	thifensulfuron & tribenuron	50 + 25XP	15.00 oz	0.15 oz	0.3 oz	0.6 oz	2.25	4.50	9.00
Authority Assist FMC	imazethapyr & sulfentrazone	0.67 + 3.33L	2.35 fl oz	4 fl oz	5 fl oz	6 fl oz	9.40	11.75	14.10
Authority First FMC	cloransulam & sulfentrazone	7.9 + 62.1WDG	4.40 oz	2.4 oz	3.2 oz	4 oz	10.50	14.10	17.60
Authority MTZ FMC	metribuzin & sulfentrazone	0.27 + 0.18WDG	19.00 lb	8 oz	10 oz	12 oz	9.50	11.90	14.25
Avenge AMVAC	difenzoquat	2SL	38.00 gal	2.5 pt	3 pt	4 pt	11.90	14.25	19.00
Axial XL Syngenta	pinoxaden & cloquintocet safener	0.42EC	110.00 gal	16.4 fl oz	-	16.4 fl oz	14.10	-	14.10
Balance Flexx Bayer	isox & cyprosulfamide safener	2L	4.50 fl oz	3 fl oz	4.5 floz	6 fl oz	13.50	20.25	27.00
Balance Pro Bayer	isoxaflutole	4L	8.00 fl oz	1.5 fl oz	2.25 floz	3 fl oz	12.00	18.00	24.00
Banvel Arysta	dicamba-dma salt	4SL	58.00 gal	2 fl oz	4 fl oz	8 fl oz	0.90	1.80	3.60
Banvel & 2,4-D Arysta	2,4-D-dea & dicamba-dea	2.87 + 1SL	30.00 gal	0.5 pt	2 pt	4 pt	1.90	7.50	15.00
Banvel-K+Atra Arysta	atrazine & dicamba-K salt	2.1 + 1.1L	32.00 gal	2 pt	3 pt	3.5 pt	8.00	12.00	14.00
Barrage HF Helena	2,4-D ethylhexyl-ester	4.7SL	32.00 gal	6 fl oz	9 fl oz	13 fl oz	1.50	2.25	3.25
Basagran Arysta	bentazon-Na salt	4SL	100.00 gal	1 pt	1.5 pt	2 pt	12.50	18.25	25.00
Basis Dupont	rimsulfuron & thifensulfuron	50 + 25DF	18.00 oz	0.33 oz	0.67 oz	1 oz	5.95	12.05	18.00
Beacon Syngenta	primisulfuron-methyl	75DF	34.00 oz	0.38 oz	0.5 oz	0.76 oz	12.95	17.00	25.85
Betamix Bayer	desmedipham & phenmedipham	0.65 + 0.65EC	95.00 gal	4.62 pt	6 pt	7.7 pt	54.85	71.25	91.45
Betanex Bayer	desmedipham	1.3EC	105.00 gal	4.62 pt	6 pt	7.7 pt	60.65	78.75	101.10
Beyond BASF	imazamox-NH <sub>4</sub>	1SL	610.00 gal	2 fl oz	3 fl oz	4 fl oz	9.55	14.30	19.10
Bicep II Magnum Syng	atrazine & S-metolachlor	3.1 + 2.4L	48.00 gal	2.1 qt	2.35 qt	2.6 qt	25.20	28.20	31.20
Bicep Lite II Magnum "	atrazine & S-metolachlor	2.67 + 3.23L	58.00 gal	1.5 qt	1.9 qt	2.2 qt	21.75	27.55	31.90
Bison Winfield	bromoxynil ester & MCPA ester	2 + 2EC	50.00 gal	0.75 pt	1 pt	1.5 pt	4.70	6.25	9.40
Bison Advanced "	bromoxynil ester & MCPA ester	2.5 + 2.5EC	50.00 gal	0.8 pt	1.2 pt	1.6 pt	5.00	7.50	10.00
BNB Plus UPI	desmed & phenmed & ethofum	0.6 + 0.6 + 0.6EC	75.00 gal	0.8 pt	2 pt	3.3 pt	7.50	18.70	30.95
Boundary Syngenta	S-metolachlor & metribuzin	5.25 + 1.25L	88.00 gal	1.2 pt	1.5 pt	2.25 pt	13.20	16.50	24.75
Brash Winfield	2,4-D-dma & dicamba-dma	2.87 + 1SL	35.00 gal	0.5 pt	2 pt	4 pt	2.20	8.75	17.50
Brawl Tenkoz	S-metolachlor	7.62EC	112.00 gal	1.33 pt	1.67 pt	2 pt	18.65	23.40	28.00
Brawl II Tenkoz	S-metolachlor & benoxacor safen	7.64EC	117.00 gal	1.33 pt	1.67 pt	2 pt	19.45	24.45	29.25
Breakfree Dupont	acetochlor & dichlormid safener	6.4EC	90.00 gal	1.5 pt	2 pt	2.25 pt	16.85	22.50	25.30
Breakfree ATZ Lite "	acetochlor & atrazine	4 + 1.5L	55.00 gal	1.5 qt	1.8 qt	2.1 qt	20.65	24.75	28.90
Broadrange 55 WECO	2,4-D-dea	5.03L	30.50 gal	0.38 pt	0.75 pt	1.5 pt	1.45	2.85	5.75
Broclean UAP	bromoxynil-ester	2EC	55.00 gal	1 pt	1.5 pt	2 pt	6.90	10.30	13.75

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Bromac UAP	bromoxynil-ester & MCPA-ester	2 + 2EC	48.00 gal	0.75 pt	1 pt	1.5 pt	4.50	6.00	9.00
Bromac Advanced UAP	bromoxynil-ester & MCPA-ester	2.5 + 2.5EC	51.00 gal	0.8 pt	1.2 pt	1.6 pt	5.00	7.50	10.00
Bromox MCPA Albaugh	bromoxynil-ester & MCPA-ester	2 + 2EC	58.00 gal	0.75 pt	1 pt	1.5 pt	5.45	7.25	10.90
Bronate Advanccd Bayer	bromoxynil-ester & MCPA-ester	2.5 + 2.5EC	62.00 gal	0.8 pt	1.2 pt	1.6 pt	6.20	9.30	12.40
Brox Albaugh	bromoxynil-ester	2EC	65.00 gal	1 pt	1.5 pt	2 pt	8.15	12.20	16.25
Brox M Albaugh	bromoxynil-ester & MCPA-ester	2 + 2EC	50.00 gal	0.75 pt	1 pt	1.5 pt	4.70	6.25	9.40
Brox M Ultra Albaugh	bromoxynil-ester & MCPA-ester	2.5 + 2.5EC	55.00 gal	0.8 pt	1.2 pt	1.6 pt	5.50	8.25	11.00
Buccaneer/Plus Tenkoz	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	3 pt	3.75	7.50	11.25
Buckle Gowan	triallate & trifluralin	10 + 3G	1.45 lb	10 lb	11 lb	12.7 lb	14.50	15.95	18.40
Buctril Bayer	bromoxynil-ester	2EC	72.00 gal	1 pt	1.5 pt	2 pt	9.00	13.50	18.40
Butyrac 200 Albaugh	2,4-DB-dma salt	2SL	40.00 gal	2 pt	3 pt	4 pt	10.00	15.00	20.00
Cadence UAP	acetochlor & dichlormid safener	6.4EC	65.00 gal	1.5 pt	2 pt	2.25 pt	12.20	16.25	18.30
Cadet FMC	fluthiacet-methyl	0.91SL	320.00 qt	0.4 fl oz	0.65 fl oz	0.9 fl oz	4.00	6.50	9.00
Callisto Syngenta	mesotrione	4SE	630.00 gal	2 fl oz	2.5 fl oz	3 fl oz	9.85	12.30	14.75
Camix Syngenta	mesotrione & S-metolachlor	0.334 + 3.34L	65.00 gal	0.8 qt	1.2 qt	1.6 qt	13.00	19.50	26.00
Capreno Bayer	tembo & thiencazabone & isox	2.88 + 0.57SC	- gal	2 fl oz	2.5 fl oz	3 fl oz	-	-	-
Casoron 4G Uniroyal	dichlobenil	4G	2.50 lb	100 lb	150 lb	200 lb	250.00	375.50	500.00
Casoron 10G Uniroyal	dichlobenil	10G	6.25 lb	40 lb	60 lb	80 lb	250.00	375.00	500.00
Certainty Monsanto	sulfosulfuron	75DF	120.00 oz	0.5 oz	-	0.75 oz	60.00	-	90.00
Chaparral Dow	aminopyralid-K + metsulfuron	52.5 + 9.45DF	88.00 lb	1 oz	2 oz	3 oz	5.50	11.00	16.50
Charger Basic Winfield	S-metolachlor	7.62EC	105.00 gal	1.33 pt	1.67 pt	2 pt	17.45	21.90	26.25
Charger Max Winfield	S-metolachlor & benoxacor safen	7.64EC	110.00 gal	1.33 pt	1.67 pt	2 pt	18.45	23.00	27.50
Chateau Valent	flumioxazin	51WDG	7.20 oz	1.5 oz	2 oz	2.5 oz	10.90	14.40	18.00
Chism Cheminova	chlorsulfuron & metsulfuron	15 + 48DF	8.00 oz	0.25 oz	0.375 oz	0.625 oz	2.00	3.00	5.00
Cimarron Dupont	metsulfuron-methyl	60DF	- oz	0.05 oz	0.1 oz	0.3 oz	-	-	-
Cimarron Max Dupont	Ally+Weed Master (2,4-D & dica)	60DF + 2.87 & 1SL	250.00 case	.25oz+1	0.5+2pt	1oz+4pt	6.25	12.50	25.00
Cimarron Plus Dupont	chlorsulfuron & metsulfuron	15 + 48DF	12.00 oz	0.25 oz	0.375 oz	0.625 oz	3.00	4.50	7.50
Cimarron X-tra Dupont	chlorsulfuron & metsulfuron	37.5 + 30DF	15.00 oz	0.5 oz	1 oz	2 oz	7.50	15.00	30.00
Cinch Dupont	S-metolachlor & benoxacor safen	7.64EC	120.00 gal	1.33 pt	1.67 pt	2 pt	19.95	25.05	30.00
Cinch ATZ Lite Dupont	atrazine & metolachlor	2.67 + 3.23L	58.00 gal	1 qt	1.5 qt	1.9 qt	14.50	21.75	27.55
Clarity BASF	dicamba-dga salt	4SL	110.00 gal	2 fl oz	4 fl oz	8 fl oz	1.70	3.45	6.90
Classic Dupont	chlorimuron	75DF	15.00 oz	0.25 oz	0.33 oz	0.5 oz	3.75	4.95	7.50
CleanWave Dow	aminopyralid & fluroxypyr	0.08 + 1.12EC	65.00 gal	10 fl oz	12 fl oz	14 fl oz	5.10	6.10	7.10
ClearMax BASF	imazamox / MCPA-ester copack	1SL / 3.7EC	220.00 gal	12 fl oz	16 fl oz	18 fl oz	20.65	27.50	30.95
Clethodim Arysta	clethodim	2EC	105.00 gal	4 fl oz	6 fl oz	8 fl oz	3.30	4.95	6.55
Clopyr Ag UPI	clopyralid-monoea salt	3SL	410.00 gal	1.3 fl oz	2.6 fl oz	0.25 pt	4.15	8.35	12.80
Cobra Valent	lactofen	2EC	160.00 gal	6 fl oz	8 fl oz	12.8 fl oz	7.70	10.00	16.00
Colt AS UAP	clopyralid-MEAsalt & fluroxypyr-e	0.75 + 0.75EC	76.00 gal	1 pt	1.25 pt	1.33 pt	9.50	11.90	12.65
Comet Nufarm	fluroxypyr-ester	1.5EC	130.00 gal	0.5 pt	0.67 pt	1 pt	8.15	10.90	16.25
Confidence Winfield	acetochlor & safener	7EC	95.00 gal	1.25 pt	1.75 pt	2.25 pt	14.85	20.80	26.75
Confidence Extra "	acet & dichlormid & atra	4.3 + 1.7F	65.00 gal	1.2 qt	1.5 qt	1.8 qt	19.50	24.40	29.25
Cornerstone/Plus "	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Corvus Bayer	isox & thiencazabone & cyprosulf	2.63SC	5.25 fl oz	3.3 fl oz	4.5 fl oz	5.6 fl oz	17.35	23.65	29.40
CreditDuo/Extra Nufarm	glyt-ipa salt & glyt-NH <sub>4</sub>	2.7 + 0.3SL	35.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Credit Master Nufarm	glyphosate-ipa & 2,4-D-ipa	0.9 + 1.5SL	- gal	27 fl oz	40 fl oz	54 fl oz	-	-	-
Crossbow Dow/UAP	triclopyr-bee & 2,4-D-bee	1 + 2SL	70.00 gal	1 qt	3 qt	6 qt	17.50	52.50	105.00
Crossing 4L Wilbur-Ellis	sulfentrazone	4L	- gal	3 fl oz	4.5 fl oz	6 fl oz	-	-	-
Curtail Dow	clopyralid-mea & 2,4-D-3ipa salt	0.38 + 2SL	50.00 gal	2 pt	2.67 pt	4 pt	12.50	16.70	25.00
Curtail M Dow	clopyralid-acid & MCPAioester	0.42 + 2.35SL	55.00 gal	1.75 pt	2 pt	2.33 pt	12.10	13.75	16.05
Cutback Nufarm	clopyralid-mea & 2,4-D-tipa salt	0.38 + 2SL	40.00 gal	2 pt	2.67 pt	4 pt	10.00	13.35	20.00
Cutback M Nufarm	clopyralid-acid & MCPAioester	0.42 + 2.35SL	40.00 gal	1.75 pt	2 pt	2.33 pt	8.75	10.00	11.65
Dacthall Amvac	DCPA	6F	150.00 gal	8 pt	10 pt	14 pt	150.00	187.75	262.50
Dacthall Amvac	DCPA	75WDG	20.00 lb	8 lb	10 lb	14 lb	160.00	200.00	280.00
Dally WECO	triasulfuron	75DF	- oz	0.14 oz	0.28 oz	0.56 oz	-	-	-
Dawn Cheminova	fomesafen-Na	2EC	120.00 gal	0.5 pt	0.75 pt	1 pt	7.50	11.25	15.00
Degree Monsanto	acetochlor	3.8ME	55.00 gal	3 pt	4 pt	4.25 pt	20.65	27.50	29.25
Degree Xtra Monsanto	acetochlor & atrazine	2.7 + 1.34ME	40.00 gal	2 qt	3 qt	3.7 qt	20.00	30.00	37.00
Des-i-cate II UPI	endothall	2SL	50.00 gal	1.5 qt	-	2 qt	18.75	-	25.00
Diablo Nufarm	dicamba-dma salt	4SL	50.00 gal	2 fl oz	4 fl oz	8 fl oz	0.80	1.60	3.15
Dicamba Albaugh	dicamba-dma salt	4SL	87.00 gal	2 fl oz	4 fl oz	8 fl oz	1.35	2.75	5.45
Diligent Dupont	chlorimuron&rimsulf&flumioxazin	6.31+6.31+25.25DF	- oz	4 oz	-	4 oz	-	-	-
Dimetric Winfield	metribuzin	75DF	16.50 lb	1.6 oz	0.25 lb	0.67 lb	1.65	4.15	11.05

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Discover NG Syngenta	clodinafop-propargyl & oil adj.	0.5EC	160.00 gal	12.8 fl oz	14.5 fl oz	16 fl oz	16.00	18.15	20.00
Distinct BASF	dicamba-Na & diflufenzopyr-Na	50 + 20WDG	3.20 oz	2 oz	4 oz	6 oz	6.40	12.80	19.20
Diuron Seveal	diuron	80WDG	6.00 lb	0.75 lb	2 lb	6 lb	4.50	12.00	36.00
DoubleUp B&G Helena	bromoxynil-ester & 2,4-D-ester	2 + 1.9EC	58.00 gal	0.5 pt	0.75 pt	1 pt	3.65	5.45	7.25
Domain Rosens	flufenacet & metribuzin	24 + 36WDG	0.90 oz	9 oz	12 oz	14 oz	8.10	10.80	12.60
Dual Magnum Syngent	S-metolachlor	7.62EC	120.00 gal	1.33 pt	1.67 pt	2 pt	19.95	25.05	30.00
Dual II Magnum "	S-metolachlor & benoxacor safen	7.64EC	120.00 gal	1.33 pt	1.67 pt	2 pt	19.95	25.05	30.00
Duramax Dow	glyphosate-dma salt	4SL	80.00 gal	12 fl oz	24 fl oz	48 fl oz	7.50	15.00	30.00
Durango DMA Dow	glyphosate-dma salt	4SL	60.00 gal	12 fl oz	24 fl oz	48 fl oz	5.65	11.25	22.50
E-99 Winfield	2,4-D-beester	6.1EC	34.00 gal	0.33 pt	0.67 pt	1.33 pt	1.40	2.85	5.65
Edition B-Spec Chmnva	thifensulfuron & tribenuron	25 + 25DF	6.50 oz	0.4 oz	0.6 oz	1 oz	2.60	3.90	6.50
Edition TankMix "	thifensulfuron & tribenuron	40 + 10DF	5.00 oz	0.6 oz	0.75 oz	1 oz	3.00	3.75	5.00
Encompass Tenkoz	flumioxazin	51WDG	4.90 oz	2 oz	2.5 oz	3 oz	9.00	12.85	14.70
Enlite Dupont	chlorimuron&flumioxazin&thifen	2.85 + 36.21 + 8.8DF	5.00 oz	1.4 oz	2.1 oz	2.8 oz	7.00	10.50	14.00
Epic Rosens	flufenacet & isoxaflutole	48 + 10DF	2.50 oz	5 oz	6 oz	8 oz	12.25	15.00	20.00
Eptam Gowan	EPTC	7EC	44.00 gal	2.3 pt	4 pt	6.75 pt	12.65	22.00	37.15
Eradicane Gowan	EPTC & dichlormid safener	6.7EC	38.00 gal	4.75 pt	6 pt	7.33 pt	22.60	28.50	32.10
Escort Dupont	metsulfuron-methyl	60XP	25.00 oz	0.33 oz	1 oz	2 oz	8.25	25.00	50.00
Establish Tenkoz	dimethenamid-P	6EC	170.00 gal	16 fl oz	18 fl oz	21 fl oz	21.25	23.90	27.90
Ethotron SC UPI	ethofumesate	4EC	85.00 gal	6 pt	7 pt	7.5 pt	63.75	74.40	79.70
Everest Arysta	flucarbazone-Na	70WDG	32.00 oz	0.4 oz	0.5 oz	0.6 oz	12.80	16.00	19.20
Expert Syngenta	S-met & atra & glyphosate-ipa	1.74 + 2.14 + 0.75SC	40.00 gal	2.5 qt	3 qt	3.75 qt	25.00	30.00	37.50
Express DF Dupont	tribenuron-methyl	75DF	25.00 oz	1/8 oz	1/6 oz	1/3 oz	3.15	4.15	8.25
Express SG Dupont	tribenuron-methyl	50SG	17.00 oz	1/4 oz	1/3 oz	1/2 oz	4.25	5.60	8.50
Extra Credit Nufarm	glyphosate-ipa salt	3.75SL	45.00 gal	0.8 pt	1.6 pt	3.2 pt	4.50	9.00	18.00
Extreme BASF	imazethapyr-acid & glyph-ipa	0.17 + 2SL	50.00 gal	1.5 pt	2.25 pt	3 pt	9.40	14.10	18.75
Fallow Master Monsnto	glyphosate-ipa & dicamba-ipa	1.6 + 0.4SL	- gal	22 fl oz	32 fl oz	44 fl oz	-	-	-
Fallow Star Albaugh	glyphosate-ipa & dicamba-ipa	1.1 + 0.5SL	25.00 gal	22 fl oz	32 fl oz	44 fl oz	4.30	6.25	8.60
Far-Go EC Gowan	triallate	4EC	45.00 gal	1 qt	1.25 qt	1.5 qt	11.25	14.20	16.90
Far-Go G Gowan	triallate	10G	1.12 lb	10 lb	12.5 lb	15 lb	11.20	14.00	16.80
Field Master Monsanto	acet & atra & glyphosate-ipa salt	2 + 1.5 + 0.56SC	- gal	1.33 qt	2 qt	2.67 qt	-	-	-
Finesse Dupont	chlorsulfuron & metsulfuron-CH <sub>3</sub>	62.5 + 12.5DF	18.00 oz	0.2 oz	0.25 oz	0.3 oz	3.60	4.50	5.40
Finesse G&B Dupont	chlorsulfuron & flucarbazone-Na	25 + 46.7DF	20.00 oz	0.6 oz	0.72 oz	0.9 oz	12.00	14.40	18.00
Firestorm Chemtura	paraquat-dichloride	3SL	32.00 gal	0.7 pt	1 pt	1.35 pt	-	-	-
FirstRate Dow	cloransulam-methyl	84WDG	35.00 oz	0.3 oz	0.6 oz	0.75	10.50	21.00	26.25
Flexstar Syngenta	fomesafen-Na & adjuvants	1.88EC	125.00 gal	0.5 pt	0.75 pt	1 pt	7.80	11.75	15.65
Flexstar GT Syngenta	fomesafen & glypht & adjuvants	0.66 + 2.63SL	55.00 gal	2 pt	2.5 pt	3 pt	13.75	17.20	20.65
Forefront R&P Dow	aminopyralid & 2,4-D	0.33 + 2.67EC	60.00 gal	1.5 pt	2 pt	2.6 pt	11.25	15.00	19.50
Freestyle Dupont	chlorimuron & thifensulf & triben	12.5+18.75+18.75DF	- oz	0.66 oz	-	0.66 oz	-	-	-
FulTime Dow	acetochlor-ME & atrazine	2.4 + 1.6L	38.00 gal	2.5 qt	2.7 qt	3 qt	23.75	25.65	28.50
Fusilade DX Syngenta	fluazifop-P butyl	2EC	200.00 gal	6 fl oz	10 fl oz	12 fl oz	9.40	15.65	18.75
Fusion Syngenta	fluazifop-P & fenoxaprop	2 + 0.66EC	200.00 gal	6 fl oz	10 fl oz	12 fl oz	9.40	15.65	18.75
Gangster Valent	Copack:flumioxazin&cloransulm	51WDG / 84WDG	680.00 cont	1.8 oz	2.4 oz	3 oz	14.15	18.90	23.60
Garlon EC Dow	triclopyr-ester	4EC	120.00 gal	1 qt	2 qt	4 qt	30.00	60.00	120.00
Garlon SL Dow	triclopyr-ester	3SL	90.00 gal	2 qt	1 gal	2 gal	45.00	90.00	180.00
Garrison Nufarm	clopyralid-monoethanolamine salt	3SL	200.00 gal	1.3 fl oz	2.6 fl oz	0.25 pt	2.05	4.10	6.25
Glean Dupont	chlorsulfuron	75DF	20.00 oz	1/6 oz	-	1/3 oz	3.33	-	6.66
Glyfos/X-tra Cheminva	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Glyphogan MANA	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
GlyKamba Nufarm	glyphosate-ipa & dicamba-ipa	1.6 + 0.4SL	25.00 gal	22 fl oz	32 fl oz	44 fl oz	4.30	6.25	8.60
Gly Star/Plus Albaugh	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Gly Star 5/Extra "	glyphosate-ipa salt	4SL	- gal	12 fl oz	24 fl oz	48 fl oz	-	-	-
Gly Star Gold/Extra "	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Gly Star Original "	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Gly Star Plus Albaugh	glyphosate-ipa salt	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	17.50
G-Max Lite BASF	atrazine & dimethenamid-P	2.75 + 2.25L	68.00 gal	1.5 pt	2 pt	2.5 pt	12.75	17.00	21.25
Goal Dow	oxyfluorfen	2EC	98.00 gal	4 pt	6 pt	8 pt	45.00	67.50	90.00
GoldSky Dow	pyrox&floras&flurox&cloquintocet	0.11+0.018+0.71EC	125.00 gal	1 pt	-	1 pt	15.65	-	15.65
Gramoxone Inteon "	paraquat-dichloride	2SL	34.00 gal	1.2 pt	1.5 pt	2 pt	5.10	6.40	8.50
GrazonNext Dow	aminopyralid-3ipa + 2,4-D-3ipa	0.33 + 2.67AE	36.00 gal	1.5 pt	2 pt	2.6 pt	6.75	9.00	11.70
Grazon P+D Dow	picloram-3ipa & 2,4-D-3ipa	0.54 + 2 S	40.00 gal	2 qt	3 qt	4 qt	20.00	30.00	40.00
Guardsman Max BASF	atrazine & dimethenamid-P	3.3 + 1.7L	60.00 gal	2.8 pt	3.6 pt	4.2 pt	21.00	27.00	31.50

Product	Active Ingredients	Formulation	Cost \$/Unit	Product/A			Cost \$/A			
				Low	Med	High	Low	Med	High	
Gun Slinger	Albaugh	picloram-3ipamine & 2,4-D-3ipa	0.54 + 2 S	- gal	2 qt	3 qt	4 qt	-	-	-
Habitat	BASF	imazapyr-ipa salt	2SL	250.00 gal	1 qt	2 qt	3 qt	62.50	125.00	187.50
Halex GT	Syngenta	mesotrione & glyt-K & S-meto	4.39 SC (1:10:10)	62.00 gal	2 pt	2.6 pt	3.6 pt	15.50	20.15	27.90
Harass	Chemnova	thifensulfuron-methyl	75DF	21.00 oz	1/12 oz	0.3 oz	0.6 oz	1.75	6.30	12.60
Harmony Extra	Dupont	thifensulfuron & tribenuron	50 + 25XP	15.00 oz	0.15 oz	0.3 oz	0.6 oz	2.25	4.50	9.00
Harmony Extra	Dupont	thifensulfuron & tribenuron	33.33 + 16.67SG	16.00 oz	0.45 oz	0.7 oz	0.9 oz	7.20	11.20	14.40
Harmony GT	Dupont	thifensulfuron-methyl	75XP	21.00 oz	1/12 oz	0.3 oz	0.6 oz	1.75	6.30	12.60
Harmony SG	Dupont	thifensulfuron-methyl	50SG	32.00 oz	0.3 oz	0.45 oz	0.7 oz	9.60	14.40	22.40
Harness	Monsanto	acetochlor & dichlormid safener	7EC	100.00 gal	1.25 pt	1.75 pt	2.25 pt	15.65	21.90	28.15
Harness Xtra	Monsanto	acet & dichlormid & atrazine	4.3 + 1.7F	65.00 gal	1.2 qt	1.5 qt	1.8 qt	19.50	24.40	29.25
Harness Xtra 5.6L	"	acet & dichlormid & atrazine	3.1 + 2.5F	50.00 gal	1.5 qt	1.7 qt	2.3 qt	18.75	21.25	28.75
Helosate 70	Helm Ag	glyphosate-ipa salt	5SL	- gal	10 fl oz	20 fl oz	40 fl oz	-	-	-
Helosate Plus	Helm Ag	glyphosate-ipa salt	3SL	25.00 gal	1 pt	2 pt	4 pt	3.15	6.25	12.50
Hornet	Dow	flumetsulam & clopyralid-K salt	18.5 + 60WDG	4.50 oz	2 oz	3 oz	4 oz	9.00	13.50	18.00
Huskie	Bayer	brom & pyrasulfotole & mefenpyr	2.08EC-26.3%+3.3%	100.00 gal	11 fl oz	12.8 fl oz	13.5 fl oz	8.60	10.00	10.55
Hyvar X-L	Dupont	bromacil	2L	80.00 gal	1.5 gal	3 gal	6 gal	120.00	240.00	480.00
Ignite 280	Bayer	glufosinate-NH <sub>4</sub>	2.34SL	70.00 gal	11 fl oz	22 fl oz	33 fl oz	6.00	12.10	24.10
Impact	Amvac	topramezone	2.8SC	21.00 oz	0.33 oz	0.5 oz	0.75 oz	7.00	10.50	15.75
Imperium	Gowan	acetochlor & safener & EPTC	1.4 + 5.6EC	25.00 gal	4.5 pt	6 pt	7 pt	14.10	18.75	21.90
Impose	MANA	imazapic-acid	2SL	- gal	4 fl oz	8 fl oz	12 fl oz	-	-	-
Instigate	Dupont	chlorimuron&rimsulf&mesotrione	4.7 + 4.7 + 31.2DF	- oz	6.9 oz	-	6.9 oz	-	-	-
Integrity	BASF	saflufenacil & dimethenamid-P	-	- gal	-	-	-	-	-	-
Intensity	UAP	clethodim	2EC	128.00 gal	4 fl oz	6 fl oz	8 fl oz	4.00	6.00	8.00
Intensity One	UAP	clethodim	1EC	125.00 gal	6 fl oz	8 fl oz	12 fl oz	6.85	7.80	11.70
Intrro	Monsanto	alachlor	4EC	25.00 gal	2 qt	2.5 qt	3 qt	12.50	15.65	18.75
Journey	BASF	imazapic-acid & glyphosate-ipa	2.25SL	200.00 gal	10.7 fl oz	21.3 fl oz	32 fl oz	16.75	33.30	50.00
KambaMaster	Nufarm	2,4-D-deamine & dicamba-dea	2.87 + 1SL	- gal	0.5 pt	2 pt	4 pt	-	-	-
Karmex	Griffin	diuron	80XP	8.00 lb	2 lb	6 lb	8 lb	16.00	48.00	64.00
Keystone LA	Dow	acetochlor & atrazine	4 + 1.5L	60.00 gal	1.33 qt	1.5 qt	1.8 qt	19.95	22.50	27.00
Krovar I	Dupont	bromacil & diuron	40 + 40DF	14.00 lb	6 lb	12 lb	16 lb	84.00	168.00	224.00
Landmaster BW	Albgh	glyphosate-ipa & 2,4-D-ipa	0.9 + 1.5SL	25.00 gal	27 fl oz	40 fl oz	54 fl oz	5.27	7.80	10.55
Latigo	Helena	dicamba-acid & 2,4-D-acid	1.8 + 2.4 SL	58.00 gal	0.33 pt	0.67 pt	1 pt	2.40	4.85	7.25
Laudis	Bayer	tembotrione & isoxadifen safener	3.5 + 1.75SC	5.00 oz	2 fl oz	2.5 fl oz	3 fl oz	10.00	12.50	15.00
Liberty	Bayer	glufosinate-NH <sub>4</sub>	1.67SL	72.00 gal	28 fl oz	31 fl oz	34 fl oz	15.75	17.45	19.15
Lightning	BASF	imazethapyr-acid & imazapyr	52.5 + 17.5WDG	15.00 oz	0.75 oz	1.00 oz	1.28 oz	11.25	15.00	19.20
Lorox	Griffin	linuron	50DF	20.00 lb	1 lb	3 lb	6 lb	20.00	60.00	120.00
Lumax	Syngenta	atrazine & mesotrione & S-metol	1 + 0.268 + 2.68	65.00 gal	1 pt	2 pt	3 pt	8.15	16.25	24.40
Mad Dog/Plus	UAP	glyphosate-ipa	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Maestro D	Nufarm	bromoxynil-ester & 2,4-D-ester	2 + 1.9EC	40.00 gal	0.75 pt	1.33 pt	2 pt	3.75	6.65	10.00
Maestro MA	Nufarm	bromoxynil-ester & MCPA-ester	2 + 2EC	38.00 gal	0.75 pt	1 pt	1.5 pt	3.55	4.75	7.15
Makaze	UAP	glyphosate-ipa	3SL	40.00 gal	1 pt	2 pt	4 pt	5.00	10.00	20.00
Marksman	BASF	atrazine & dicamba-K salt	2.1 + 1.1L	35.00 gal	2 pt	3 pt	3.5 pt	8.75	13.15	15.30
Matrix	Dupont	rimsulfuron	25DF	16.00 oz	1 oz	-	1.5 oz	16.00	-	24.50
Maverick	Monsanto	sulfosulfuron	75DF	18.00 oz	0.33 oz	0.5 oz	0.67 oz	5.90	9.00	12.10
MCPA amine	Several	MCPA-amine	4SL	22.00 gal	0.4 pt	1 pt	2 pt	1.10	2.75	5.50
MCPA ester	Several	MCPA-ester	4EC	24.00 gal	0.5 pt	1 pt	2 pt	1.50	3.00	6.00
Metribuzin	MANA	metribuzin	75DF	20.00 lb	1.6 oz	0.25 lb	0.67 lb	2.00	5.00	13.40
Metsulfuron	Arysta	metsulfuron-methyl	60XP	14.00 oz	0.05 oz	0.1 oz	0.3 oz	0.70	1.40	4.20
Milestone	Dow	aminopyralid-3ipNH <sub>4</sub> salt	2EC	350.00 gal	3 fl oz	5 fl oz	7 fl oz	8.20	13.70	19.15
Moxy	Winfield	bromoxynil-ester	2EC	64.00 gal	1 pt	1.5 pt	2 pt	8.00	12.00	16.00
Nic-It	Chemnova	nicosulfuron	2L	5.30 fl oz	1 fl oz	1.5 fl oz	2 fl oz	5.30	7.95	10.60
Nico	Helm Agro	nicosulfuron	75DF	16.00 oz	0.33 oz	0.5 oz	0.67 oz	5.30	8.00	10.75
Nimble	Chemnova	thifensulfuron & tribenuron	50 + 25DF	9.00 oz	0.15 oz	0.3 oz	0.6 oz	1.35	2.70	5.40
NorthStar	Syngenta	dicamba-Na & primisulfuron	39.9 + 7.5WDG	2.50 oz	5 oz	-	5 oz	12.50	-	12.50
Nortron SC	Bayer	ethofumesate	4EC	105.00 gal	6 pt	7 pt	7.5 pt	78.75	91.90	98.45
Nuance	Chemnova	tribenuron-methyl	75DF	11.00 oz	1/8 oz	1/6 oz	1/3 oz	1.40	1.85	3.65
Obtain EC	Arysta	fluroxypyr-ester	2.8EC	- gal	0.25 pt	0.35 pt	0.54 pt	-	-	-
Obtain WDG	Arysta	fluroxypyr-ester	40WDG	- lb	3.75 oz	5 oz	7.5 oz	-	-	-
Olympus	Bayer	propoxycarbazono-Na	70WDG	13.00 oz	0.4 oz	0.5 oz	0.6 oz	5.20	6.50	7.80
Option	Bayer	foramsulfuron & isoxadifen safen	35DF + 35DF	10.50 oz	1.25 oz	1.33 oz	1.5 oz	13.15	14.00	15.75
Orion	Syngenta	florasulam & MCPA-ehe	0.033 + 2.34EC	50.00 gal	17 fl oz	-	17 fl oz	6.65	-	6.65
Oust	Dupont	sulfometuron-methyl	75XP	12.00 oz	2 oz	6 oz	8 oz	24.00	72.00	96.00

Product		Active Ingredients	Formulation	Cost \$/Unit	Product/A			Cost \$/A		
					Low	Med	High	Low	Med	High
Oust Extra	Dupont	sulfometuron & metsulfuron	56.25 + 15DF	- oz	3 oz	4 oz	5 oz	-	-	-
Outlaw	Albaugh	2,4-D-ehe & dicamba-acid	1.45 + 1.09SL	32.00 gal	1.5 pt	1.75 pt	2.75 pt	6.00	7.00	11.00
Outlook	BASF	dimethenamid-P	6EC	175.00 gal	10 fl oz	14 fl oz	18 fl oz	13.70	19.15	24.60
Outrider	Monsanto	sulfosulfuron	75DF	- oz	0.75 oz	1.33 oz	2 oz	-	-	-
Overdrive	BASF	dicamba-Na & diflufenzopyr-Na	50 + 20WDG	3.00 oz	4 oz	6 oz	8 oz	12.00	18.00	24.00
Parallel	MANA	metolachlor & safener	7.8EC	50.00 gal	1.33 pt	1.67 pt	2 pt	8.30	10.45	12.50
Parallel PCS	MANA	metolachlor	8EC	50.00 gal	1.33 pt	1.67 pt	2 pt	8.30	10.45	12.50
Paramount	BASF	quinclorac	75DF	3.75 oz	5.3 oz	6.5 oz	8 oz	19.90	24.40	30.00
Parazone	MANA	paraquat-dichloride	3SL	45.00 gal	0.7 pt	1 pt	1.35 pt	3.95	5.65	7.60
Pathway	Dow	picloram-triipa & 2,4-D-triipa	3% + 11.2%	35.00 gal	2 gal	3 gal	4 gal	70.00	105.00	140.00
Payload	Valent	flumioxazin	51WDG	- oz	2 oz	2.5 oz	3 oz	-	-	-
Peak	Syngenta	prosulfuron	57DF	15.00 oz	0.25 oz	0.38 oz	0.5 oz	3.75	5.70	7.50
Pendant	Winfield	pendimethalin	3.3EC	31.00 gal	2.4 pt	3 pt	3.64 pt	9.30	11.65	14.10
Permit	Gowan	halosulfuron-methyl	75DF	20.00 oz	0.67 oz	1 oz	1.33 oz	13.40	20.00	26.60
Phen-Des 8+8	UPI	desmedipham & phenmedipham	0.65 + 0.65EC	85.00 gal	4.62 pt	6 pt	7.7 pt	49.10	63.75	81.80
Phenoxy 088	Winfield	2,4-D-bee	2.8EC	32.00 gal	1 pt	1.5 pt	2 pt	4.00	6.00	8.00
Phoenix	Valent	lactofen & adjuvants	2EC	180.00 gal	6 fl oz	8 fl oz	12.8 fl oz	8.45	11.25	18.00
Plateau	BASF	imazapic-NH <sub>4</sub>	2SL	270.00 gal	4 fl oz	8 fl oz	12 fl oz	8.45	16.90	25.30
Plotter	Rotam	metsulfuron-methyl (cropland)	60XP	14.00 oz	0.05 oz	0.1 oz	0.3 oz	0.70	1.40	4.20
Poast	BASF	sethoxydim	1.5EC	82.00 gal	0.5 pt	1 pt	1.5 pt	5.15	10.25	15.40
Portfolio 4L	Wilber-Ellis	sulfentrazone	4L	- gal	3 fl oz	4.5 fl oz	6 fl oz	-	-	-
PowerFlex	Dow	pyroxulam + cloquintocet safener	7.5WDG	3.15 oz	3.5 oz	-	3.7 oz	11.00	-	11.00
Powerplay	Drexel	acetochlor & safener & EPTC	1.4 + 5.6EC	33.00 gal	4.5 pt	6 pt	7 pt	18.55	24.75	28.90
Pramitol EC	Several	prometon	25EC	35.00 gal	5 gal	7.5 gal	10 gal	175.00	262.50	350.00
Pramitol 5S	Several	prometon	5PS	2.50 lb	150 lb	200 lb	400 lb	375.00	500.00	1000.00
Prefix	Syngenta	S-metolachlor & fomesafen	4.34 + 0.95EC	55.00 gal	1 pt	1.5 pt	2 pt	6.90	10.30	13.75
Pre-Pare	Arysta	flucarbazone-Na	70WDG	30.00 oz	0.4 oz	0.5 oz	0.6 oz	12.00	15.00	18.00
Princep 4L	Syngenta	simazine	4L	26.00 gal	2 qt	3 qt	4 qt	12.00	19.50	26.00
Princep Caliber 90	"	simazine	90DF	5.50 lb	1.8 lb	3 lb	4.4 lb	9.90	16.50	24.20
Priority	Tenkoz	carfentrazone & halosulfuron	12.5 + 50WDG	6.00 oz	0.5 oz	-	1 oz	3.00	-	6.00
Progress	Bayer	desmed & phenmed & ethofum	0.6 + 0.6 + 0.6EC	105.00 gal	0.8 pt	2 pt	3.3 pt	10.50	26.25	43.30
Propel	Rosens	dimethenamid-P	6EC	170.00 gal	10 fl oz	14 fl oz	18 fl oz	13.30	18.60	23.90
Prowl	BASF	pendimethalin	3.3EC	40.00 gal	2.4 pt	3 pt	3.64 pt	12.00	15.00	18.20
Prowl H2O	BASF	pendimethalin	3.8ACS	45.00 gal	2.1 pt	2.6 pt	3 pt	11.90	14.65	16.90
Puma	Bayer	fenoxaprop-P ethyl	1EC	190.00 gal	0.33 pt	0.4 pt	0.67 pt	7.85	9.50	15.90
Pursuit	BASF	imazethapyr-NH <sub>4</sub>	2AS	625.00 gal	2 fl oz	2.5 fl oz	3 fl oz	9.80	12.20	14.65
Pursuit Plus	BASF	pendimethalin & imazethapyr	2.7 + 0.2EC	62.00 gal	20 fl oz	1.8 pt	2.5 pt	9.70	13.95	19.40
Python	Dow	flumetsulam	80WDG	11.50 oz	0.8 oz	1 oz	1.33 oz	9.20	11.50	15.30
Quicksilver	FMC	carfentrazone-ethyl	1.9EW	- qt	8 fl oz	13 fl oz	18 fl oz	-	-	-
Radius	Bayer	flufenacet & isoxaflutole	3.57 + 0.43SC	200.00 gal	8 fl oz	13 fl oz	18 fl oz	12.50	20.30	28.15
Rage D-Tech	FMC	carfentrazone-ethyl & 2,4-D-ester	0.13 + 3.93EW	70.00 gal	8 fl oz	12 fl oz	16 fl oz	4.40	6.60	8.75
Range Star	Albaugh	2,4-D-dea & dicamba-dea	2.87 + 1SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Rapport BrdSpec	Nufm	thifensulfuron & tribenuron	25 + 25DF	9.25 oz	0.4 oz	0.6 oz	1 oz	3.70	5.70	9.25
Rapport TankMix	Nufm	thifensulfuron & tribenuron	40 + 10DF	8.00 oz	0.6 oz	0.75 oz	1 oz	4.80	6.00	8.00
Raptor	BASF	imazamox-NH <sub>4</sub>	1SL	625.00 gal	2 fl oz	3 fl oz	4 fl oz	9.80	14.65	19.55
Rattler / Plus	Helena	glyphosate-ipa	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Rave	Syngenta	triasulfuron & dicamba-Na salt	8.8 + 50WDG	1.80 oz	2 oz	4 oz	5 oz	3.60	7.20	9.00
Recoil	Nufarm	glyphosate-ipa & 2,4-D-acid	1.58 + 1.07SL	32.00 gal	20 fl oz	28 fl oz	40 fl oz	5.00	7.00	10.00
Redeem	Dow	clopyralid-tea & triclopyr-tea	0.75 + 2.25EC	130.00 gal	1.5 pt	2.5 pt	4 pt	24.40	40.65	65.00
Reflex	Syngenta	fomesafen-Na	2EC	120.00 gal	0.5 pt	0.75 pt	1 pt	7.50	11.25	15.00
Reglone	Syngenta	diquat-dibromide salt	2SL	105.00 gal	1 pt	1.5 pt	2 pt	13.15	19.70	26.25
Rely	Bayer	glufosinate-NH <sub>4</sub>	1SL	55.00 gal	1 pt	2 pt	3 pt	6.90	13.75	20.65
Rely 200	Bayer	glufosinate-NH <sub>4</sub>	1.67SL	54.50 gal	29 fl oz	77 fl oz	115 fl oz	12.35	32.80	49.00
Remedy	Dow	triclopyr-ester	4EC	110.00 gal	1 qt	1.5 qt	2 qt	27.50	41.25	55.00
Report	Chemnova	chlorsulfuron	75DF	12.50 oz	1/6 oz	-	1/3 oz	2.10	-	4.20
Report Extra	"	chlorsulfuron & metsulfuron-CH <sub>3</sub>	62.5 + 12.5DF	11.50 oz	0.2 oz	0.25 oz	0.3 oz	2.30	2.90	3.45
Require Q	Dupont	rimsulf & dicamba-Na & isoxadifen	6.25 + 52.94SG	3.00 oz	2 oz	3 oz	4 oz	6.00	9.00	12.00
Resolve DF	Dupont	rimsulfuron	25DF	7.50 oz	0.75 oz	-	1 oz	5.65	-	7.50
Resolve SG	Dupont	rimsulfuron	25SG	7.50 oz	0.75 oz	-	1 oz	5.65	-	7.70
Resolve Q	Dupont	rimsulfuron & thifen. & isoxadifen	18.4 + 4SG	7.50 oz	1 oz	-	1.25 oz	7.50	-	9.40
Resource	Valent	flumiclorac-ester	0.86SL	200.00 gal	1 fl oz	2 fl oz	3 oz	1.60	3.15	4.70
Rezult Copack	BASF	bentazon-Na / sethoxydim	5SL / 1EC	65.00 gal		1.6 & 1.6 pt			26.00	

Product		Active Ingredients	Formulation	Cost \$/Unit	Product/A			Cost \$/A		
					Low	Med	High	Low	Med	High
Rifle	UAP	dicamba-dma salt	4SL	70.00 gal	2 fl oz	4 fl oz	8 fl oz	1.10	2.20	4.40
Rifle D	UAP	2,4-D-dea & dicamba-dea	2.87 + 1SL	30.00 gal	0.5 pt	2 pt	4 pt	1.90	7.50	15.00
Rifle Plus	UAP	atrazine & dicamba-K salt	2.1 + 1.1L	30.00 gal	2 pt	3 pt	3.5 pt	7.50	11.25	15.00
Rimfire	Bayer	meso & propoxy-Na & mefenpyr	8.14 + 2.03WDG	6.00 oz	1.75 oz	2 oz	2.25 oz	10.50	12.00	13.50
Rodeo	Dow	glyphosate-ipa salt	4SL	50.00 gal	0.75 pt	1.5 pt	3 pt	4.70	9.40	18.75
Romet	Rotam	metsulfuron-methyl (non-crop)	60XP	14.00 oz	0.05 oz	0.1 oz	0.3 oz	0.70	1.40	4.20
Ro-Neet	Helm Agro	cycloate	6EC	165.00 gal	4 pt	4.5 pt	5.33 pt	82.50	92.90	109.95
RU Original Max	Mons	glyphosate-K salt	4.5SL	75.00 gal	11 fl oz	22 fl oz	32 fl oz	6.50	12.90	18.75
RU PowerMax	Monsnto	glyphosate-K salt	4.5SL	75.00 gal	11 fl oz	22 fl oz	32 fl oz	6.50	12.90	18.75
RU WeatherMax	"	glyphosate-K salt	4.5SL	80.00 gal	11 fl oz	22 fl oz	32 fl oz	6.90	13.75	20.00
RT 3	Monsanto	glyphosate-K salt	4.5SL	58.00 gal	11 fl oz	22 fl oz	32 fl oz	5.00	10.00	14.50
Saber	UAP	2,4-D-dma salt	3.8SL	26.00 gal	0.5 pt	1 pt	2 pt	1.65	3.25	6.50
Sahara	BASF	imazapyr-acid & diuron	7.78 + 62.2WDG	13.00 lb	5 lb	10 lb	15 lb	65.00	130.00	195.00
Salvo	UAP	2,4-D-ester	5EC	40.00 gal	6.4 fl oz	9.6 fl oz	12.8 fl oz	2.00	3.00	4.00
Sandea	Gowan	halosulfuron-methyl	75DF	45.00 oz	0.67 oz	1 oz	1.33 oz	30.15	45.00	59.85
Section	Winfield	clethodim	2EC	170.00 gal	4 fl oz	6 fl oz	8 fl oz	5.30	8.00	10.65
Select Max	Valent	clethodim	1EC	140.00 gal	6 fl oz	9 fl oz	12 fl oz	6.60	9.90	13.15
Sequence	Syngenta	glyphosate-K & S-metolachlor	2.25 + 3SC	60.00 gal	1.5 pt	2.5 pt	3 pt	11.25	18.75	22.50
Shadow	Arysta	clethodim	2EC	130.00 gal	4 fl oz	6 fl oz	8 fl oz	4.10	6.10	8.15
Sharpen	BASF	safufenacil	2.85SC	- gal	1 fl oz	-	2 fl oz	-	-	-
Shotgun	UAP	atrazine & 2,4-D-acid	2.25 + 1L	30.00 gal	1.5 pt	2 pt	2.5 pt	6.75	7.50	9.40
Simarado	Bayer	mesosulfuron & mefenpyr safener	2WDG	5.65 oz	1.75 oz	2 oz	2.25 oz	9.90	11.30	12.75
Simazine L	Several	simazine	4L	25.00 gal	2 qt	3 qt	4 qt	12.50	18.75	25.00
Simazine DF	Several	simazine	90DF	5.00 lb	1.8 lb	3 lb	4.4 lb	9.00	15.00	22.00
Sinbar	Dupont	terbacil	80WP	- lb	0.5 lb	2 lb	4 lb	-	-	-
Sonalan HFP	Dow	ethalfuralin	3EC	38.00 gal	1.5 pt	3 pt	4.5 pt	7.15	14.25	21.40
Sonalan 10G	Dow	ethalfuralin	10G	1.30 lb	6 lb	11.5 lb	17 lb	7.80	14.95	22.10
Sonic	Dow	cloransulam & sulfentrazone	7.9 + 62.1WDG	4.65 oz	2.4 oz	3.2 oz	4 oz	11.60	14.90	18.60
Spartan	FMC	sulfentrazone	4L	550.00 gal	3 fl oz	4.5 fl oz	6 fl oz	12.90	19.35	25.80
Spartan Advance	FMC	glyphosate & sulfentrazone	3 + 0.56SC	105.00 gal	16 fl oz	24 fl oz	32 fl oz	13.15	19.70	26.25
Spartan Charge	FMC	carfentrazone & sulfentrazone	0.35 + 3.15SE	425.00 gal	3.75 fl oz	4.5 fl oz	5.75 fl oz	12.45	14.95	19.10
Spartan Guard	FMC	pendimethalin & sulfentrazone	3.15 + 0.35SC	- gal	3.21 pt	-	3.68 pt	-	-	-
Spike	Dow	tebuthiuron	20P	18.00 lb	2.5 lb	5 lb	10 lb	45.00	90.00	180.00
Spur	Albaugh	clopyralid-monoea salt	3SL	430.00 gal	1.3 fl oz	2.6 fl oz	0.25 pt	4.40	8.75	13.45
Stalker	BASF	imazapyr-ipa salt	2SL	400.00 gal	48 fl oz	2 qt	3 qt	150.00	200.00	300.00
Starane Ultra	Dow	fluroxypyr-ester	2.8EC	270.00 gal	0.25 pt	0.35 pt	0.54 pt	8.45	11.80	18.25
Starane NXT	Dow	bromoxynil & fluroxypyr-ester	2.33 + 0.583EC	80.00 gal	14 fl oz	21 fl oz	27.4 fl oz	8.75	13.15	15.45
Starane & Salvo	UAP	fluroxypyr-ester & 2,4-D-ester	0.75 + 3EC	70.00 gal	1 pt	1.33 pt	1.67 pt	8.75	11.65	14.60
Starane & Sword	UAP	fluroxypyr-ester & MCPA-ester	0.71 + 2.84EC	70.00 gal	1.125 pt	1.5 pt	2 pt	9.85	13.15	17.50
Status	BASF	dic-Na&diflufenzpr-Na&isoxadifen	44 + 17.1WDG	2.80 oz	2.5 oz	4 oz	5 oz	7.00	11.20	14.00
Steadfast	Dupont	nicosulfuron & rimsulfuron	50 + 25DF	26.00 oz	0.5 oz	0.6 oz	0.75 oz	13.00	15.60	19.50
Steadfast Q	Dupont	nico & rim & isoxadifen safener	62.3DF	13.00 oz	1 oz	1.25 oz	1.5 oz	13.00	16.25	19.50
Stealth	UAP	pendimethalin	3.3EC	32.00 gal	2.4 pt	3 pt	3.64 pt	9.60	12.00	14.55
Sterling Blue	Winfield	dicamba-dga salt	4SL	85.00 gal	2 fl oz	4 fl oz	8 fl oz	1.35	2.65	5.30
Strikeout		glyphosate-ipa	3SL	30.00 gal	1 pt	2 pt	4 pt	3.75	7.50	15.00
Stinger	Dow	clopyralid-monoea salt	3SL	480.00 gal	1.3 fl oz	2.6 fl oz	0.25 pt	4.90	9.75	15.00
Storm	UPI	acifluorifen & bentazon	1.33 + 2.67SL	- gal	1 pt	1.5 pt	2 pt	-	-	-
Stout	Dupont	nicosulfuron & thifensulfuron	67.5 + 5DF	25.00 oz	0.5 oz	-	0.75 oz	12.50	-	18.75
SureStart	Dow	aceto&cloprld&flumet&dichlormid	3.75 + 0.29 + 0.12SC	88.00 gal	1.5 pt	1.75 pt	2 pt	16.50	19.25	22.00
Surflan	UPI	oryzalin	4EC	100.00 gal	2 qt	3 qt	4 qt	50.00	75.00	100.00
Surpass EC	Dow	acetochlor & dichlormid safener	6.4EC	95.00 gal	1.5 pt	2 pt	2.25 pt	17.85	23.75	26.75
Sword	UAP	MCPA ester	5.2EC	46.00 gal	3 fl oz	1 pt	2 pt	1.10	5.75	11.50
Tackle	Cheminova	imazethapyr-acid & glyph-ipa	0.128 + 3SL	34.00 gal	1 pt	1.5 pt	2 pt	4.25	6.40	8.50
Targa	Gowan	quizalofop-ethyl	0.88EC	140.00 gal	7 fl oz	8 fl oz	10 fl oz	7.65	8.75	10.95
Telar	Dupont	chlorsulfuron	75DF	25.00 oz	½ oz	1 oz	3 oz	12.50	25.00	75.00
Thistrol	Nufarm	MCPB	2EC	45.00 gal	2 pt	4 pt	6 pt	11.25	22.50	33.75
Throttle	Dupont	chlorsulf&sulfometurn&sulfentzn	9 + 18 + 48DF	11.00 oz	12.5 oz	-	12.5 oz	-	-	-
Tie Down	WECO	triasulfuron & dicamba-Na salt	8.8 + 50WDG	- oz	2 oz	4 oz	5 oz	-	-	-
TNT Broadleaf	Gowan	thifensulfuron & tribenuron	50 + 25DF	15.00 oz	0.15 oz	0.3 oz	0.6 oz	2.25	4.50	9.00
TopNotch	Dow	acetochlor (ME) & dichlormid saf.	3.2ME	46.00 gal	1.5 qt	2 qt	2.5 qt	17.25	23.00	28.75
Tordon 22K	Dow	picloram-K salt	2SL	120.00 gal	1 pt	2 pt	4 pt	15.00	30.00	60.00
Touchdown CT	Syngent	glyphosate-K salt	4.17SL	60.00 gal	0.75 pt	1.5 pt	3 pt	5.65	11.25	22.50

Product	Active Ingredients	Formulation	Cost \$/Unit	Product/A			Cost \$/A		
				Low	Med	High	Low	Med	High
Touchdown HiTech "	glyphosate-K salt	5SL	70.00 gal	10 fl oz	20 fl oz	30 fl oz	5.50	10.95	16.40
Touchdown Total "	glyphosate-K salt	4.17SL	75.00 gal	12 fl oz	24 fl oz	48 fl oz	7.10	14.10	28.15
Transline Dow	clopyralid-monoa salt	3SL	350.00 gal	0.67 pt	1 pt	1.33 pt	29.30	43.75	58.20
Traverse Dupont	chlorimuron & rimsulfuron	12.5 + 12.5DF	- oz	2.6 oz	-	2.6 oz	-	-	-
Traxion Syngenta	glyphosate-ipa	3SL	62.00 gal	1 pt	2 pt	4 pt	7.25	15.25	31.00
Treaty Nufarm	thifensulfuron-methyl	75DF	21.00 oz	1/12 oz	0.3 oz	0.6 oz	1.75	6.30	12.60
Treaty Extra Nufarm	thifensulfuron & tribenuron	50 + 25DF	15.00 oz	0.15 oz	0.3 oz	0.6 oz	2.25	4.50	9.00
Treflan HFP Dow	trifluralin	4EC	26.00 gal	1 pt	2 pt	4 pt	3.25	6.50	13.00
Treflan TR-10 Dow	trifluralin	10G	0.95 lb	5 lb	10 lb	20 lb	4.75	9.50	19.00
Tri-Cor UPI	metribuzin	4F	106.70 gal	2.4 fl oz	6 fl oz	16 fl oz	2.00	5.00	13.40
Tri-Cor UPI	metribuzin	75DF	20.00 lb	1.6 oz	0.25 lb	0.67 lb	2.00	5.00	13.40
Trifluralin EC Several	trifluralin	4EC	22.00 gal	1 pt	2 pt	4 pt	2.75	5.50	11.00
Trifluralin G Several	trifluralin	10G	0.90 lb	5 lb	10 lb	20 lb	4.50	9.00	18.00
Triflurex MANA	trifluralin	4EC	24.00 gal	1 pt	2 pt	4 pt	3.00	6.00	12.00
Trigate Dupont	rimsulfuron & triben & mesotrione	6.7 + 5 + 33.3DF	- oz	3.75 oz	-	3.75 oz	-	-	-
Trigger Albaugh	clethodim	2EC	160.00 gal	4 fl oz	6 fl oz	8 fl oz	5.00	7.50	10.00
Trimec Classic PBI	2,4-D-amine & MCPP & dicamba	3.32EC	35.00 gal	3.25 pt	3.8 pt	4.33 pt	14.25	16.65	18.95
Trimec Plus PBI	MSMA & 2,4-D-amine & MCPP-a	2.88EC	45.00 gal	2 qt	3 qt	4 qt	22.50	33.75	45.00
Triumph 22K Albaugh	picloram-K salt	2SL	95.00 gal	1 pt	2 pt	4 pt	11.90	23.75	47.50
Truslate Nufarm	clopyralid-mea & fluroxypyr-mhe	0.75 + 0.75EC	70.00 gal	0.75 pt	1 pt	1.33 pt	6.55	8.75	11.65
Trust EC Winfield	trifluralin	4EC	24.00 gal	1 pt	2 pt	4 pt	3.00	6.00	12.00
Ultra Blazer UPI	acifluorfen-Na	2SL	75.00 gal	1 pt	1.5 pt	2 pt	9.40	14.05	18.75
Unison Helena	2,4-D-acid	1.74SL	36.00 gal	1 pt	1.75 pt	2.5 pt	4.50	7.80	11.25
Unity Gowan	thifensulfuron-methyl	75DF	15.00 oz	1/12 oz	0.3 oz	0.6 oz	1.20	4.50	9.00
UpBeet Dupont	triflurosulfuron-methyl	50DF	65.00 oz	0.25 oz	0.3 oz	0.5 oz	16.25	19.50	32.50
Valor Valent	flumioxazin	51WDG	5.25 oz	2 oz	2.5 oz	3 oz	10.50	13.15	15.75
Valuron MANA	metsulfuron-methyl	60XP	6.00 oz	0.05 oz	0.1 oz	0.3 oz	0.30	0.60	1.80
Vida Gowan	pyraflufen-ethyl	0.208EC	400.00 gal	0.5 fl oz	2 fl oz	5.5 fl oz	1.55	6.25	17.20
Velpar Dupont	hexazinone	2L	80.00 gal	2 pt	4 pt	6 pt	20.00	40.00	60.50
Vengence Plus WECO	MCPA & triclopyr & dichlorprop-p	3.72 + 0.75 + 0.75EC	- gal	2 pt	2.5 pt	3 pt	-	-	-
Victory Nufarm	tribenuron-methyl	75DF	25.00 oz	1/8 oz	1/6 oz	1/3 oz	3.15	4.15	8.25
Vision Albaugh	dicamba-acid	3.8SL	94.00 gal	2 fl oz	4 fl oz	8 fl oz	1.45	2.95	5.90
Vista Dow	fluroxypyr-ester	1.5AE	100.00 gal	0.5 pt	0.67 pt	1 pt	6.25	8.40	12.50
Vista XRT Dow	fluroxypyr-ester	2.8AE	- gal	6 fl oz	12 fl oz	22 fl oz	-	-	-
Volley Tenkoz	acetochlor & dichlormid safener	6.4EC	88.00 gal	1.5 pt	2 pt	2.25 pt	16.50	22.00	24.75
Volta Rotam	thifensulfuron-methyl	75DF	21.00 oz	1/12 oz	0.3 oz	0.6 oz	1.75	6.30	12.60
Volunteer Tenkoz	clethodim	2EC	140.00 gal	4 fl oz	6 fl oz	8 fl oz	4.40	6.60	8.75
Weco Max Wilbur-Ellis	bromoxynil-ester & 2,4-D-ester	2 + 2.5EC	52.00 gal	1 pt	1.25 pt	1.5 pt	6.50	8.15	9.75
Weed Blast UAP	bromacil & diuron	4 + 4G	4.25 lb	40 lb	50 lb	60 lb	170.00	212.50	255.00
Weedone 638 Nufarm	2,4-D-acid & 2,4-D-ester	2.8EC	28.00 gal	0.67 pt	2 pt	3 pt	2.35	7.00	10.50
Weedmaster Nufarm	2,4-D-dea & dicamba-dea	2.87 + 1SL	30.00 gal	0.5 pt	2 pt	4 pt	1.90	7.50	15.00
WideMatch Dow	clopyralid-mea & fluroxypyr-mhe	0.75 + 0.75EC	80.00 gal	0.75 pt	1 pt	1.33 pt	7.55	10.75	13.30
Wildcard Helena	MCPA-ester	4EC	36.00 gal	0.5 pt	1 pt	2 pt	2.25	4.50	9.00
Wildcard Xtra Helena	bromoxynil-ester & MCPA-ester	2 + 2EC	48.00 gal	0.75 pt	1 pt	1.5 pt	4.50	6.00	9.00
Wolfpack Adv. Tenkoz	bromoxynil-ester & MCPA-ester	2.5 + 2.5EC	52.00 gal	0.8 pt	1.2 pt	1.6 pt	5.20	7.80	10.40
Wolverine Bayer	fenox&pyrasulf&bromox&mefenpr	0.4 & 0.15 & 0.75EC	100.00 gal	1.7 pt		1.7 pt	21.45	-	21.45
Yukon Gowan	dicamba-Na & halosulfuron-CH3	55 + 12.5 WDG	2.80 oz	4 oz	6 oz	8 oz	11.20	16.80	22.40
2,4-D Products	2,4-D								
2,4-D amine		3.8SL	16.00 gal	0.5 pt	2 pt	4 pt	1.00	4.00	8.00
2,4-D ester		3.8EC	20.00 gal	0.4 pt	2 pt	4 pt	1.00	5.00	10.00
LV ester		5.7EC	25.00 gal	0.33 pt	2 pt	4 pt	1.05	6.25	12.50

# Understanding a Water Quality Analysis Report

Water quality is important to herbicide efficacy and spray problems. However, the issue is complex as each herbicide may respond differently to water quality.

## 1. Water pH

High and low pH can reduce efficacy of pesticides and cause nozzle plugging with some herbicides. Some insecticides are degraded rapidly in extreme pH. Most SU (sulfonylurea) herbicides are hydrolyzed by high and low pH. However, this is not normally a problem when sprayed within a normal time period but efficacy could be reduced when mixed in water with extreme pH for a day or more. Low pH forces salt formulated herbicides into the acid state that may not be soluble in the amount of water being sprayed and thus plug nozzles and reduce efficacy.

High and low pH can increase the efficacy of certain herbicides. Some adjuvants for glyphosate formulations lower pH, but Roundup is soluble at low pH and maintains efficacy. In addition, the low pH overcomes antagonism from salts in the water (water salts will be discussed later). Herbicides need to be in solution for absorption into plant foliage. Sulfonylurea herbicides are more soluble at high pH so water with high pH may increase their efficacy. This is especially true for Accent, but certain minerals (sodium) in water may not allow the total benefit from the high pH.

## 2. Total Dissolved Solids and Electrical Conductivity

The major mineral constituents in northern plains water and their ionic chargers are:

Cations (positive charged):

calcium, magnesium, sodium, potassium, iron.

Anions (negatively charged):

sulfate, chloride, bicarbonate, nitrate.

The sum of all the minerals dissolved in a sample of water is normally referred to as the total dissolved solids (TDS). The higher the TDS, the more electric current water can conduct. Because of this characteristic, a measure of the electrical conductivity (EC) is often used to provide a quick, economical estimate of the TDS in water. If the EC is less than 500 umho/cm, water quality problems for herbicides are very unlikely. Water EC values in MT, ND, and MN run between 1000 and 2,500. Usually hardness and cation concentration, not TDS, are used to evaluate water quality on herbicide performance.

## 3. Hardness

Water hardness is caused by potassium, calcium, magnesium, and iron. These minerals can react and antagonize water soluble formulations of many weak acid herbicides like glyphosate, 2,4-D amine, MCPA amine, dicamba, bentazon, Curtail, etc. The ester formulations of herbicides are oil soluble and do not react directly with the salts in the water. However, these oil type formulations need an emulsifier so that the formulation will mix with water and sometimes these emulsifiers may be ineffective when in water with salts and cause an oil-like scum or precipitate in the spray water reducing efficacy and plugging nozzles. Refer to pages 124 to 130 above for a list amine or ester herbicide formulations.

Sodium contributes to water hardness but functions to soften water similar to home water softener systems. Hardness levels are reported in mg/L (ppm) of calcium carbonate (CaCO<sub>3</sub>). Hardness values are calculated by adding meq/L of Ca and Mg then multiplying by 50. Hardness of individual cations can be confusing because they can be reported as milliequivalents/L (meq/L), milligrams per liter (mg/L), parts per million (ppm), or grains per U.S. gallon (gpg). The mg/L and ppm are considered equal, and 1 grain per gallon is equal to 17.1 mg/L or ppm.

To convert meq/L to ppm, multiply meq/L x atomic number of the atom: K meq/L x 39.102, Na x 22.991, Mg x 12.156, Ca x 20.04. Water hardness values in MT, ND, and MN run between 0 and 2,000 ppm. There are variations in water hardness classifications but the following scale can be used:

Soft =	<75 ppm
Mod. hard =	75 – 150 ppm
Hard =	150 – 300 ppm
Very hard =	> 300 ppm

## 4. Sodium Absorption Ratio

Water high in sodium, when added to clay soils, may have a detrimental affect. Excess sodium will attach to clay particles and displace other ions, namely chloride and sulfide. A high SAR may indicate a limited ability for plants to extract water from the soil. The adjusted SAR has reference to bicarbonates. Some water in the northern plains is very high in bicarbonates, which increases the SAR problem. Water quality standards for SAR are as follows:

Excellent =	<3
Good =	3 – 5
Permissible =	5 – 10
Doubtful =	10 – 15
Unsuitable =	>15

## 5. Residual Sodium Carbonate

Values greater than 0 increase the sodium hazard.

## 6. Bicarbonates

Since bicarbonate is anionic (-) it is always associated with a cation (+) like sodium or calcium to make sodium or calcium bicarbonate in ground water. The corresponding cation (Ca, Na) may have a greater role in herbicide antagonism than the bicarbonate. High sodium and sodium bicarbonate antagonism of herbicides is usually overcome by ammonia type adjuvants. Small amounts of antagonistic salts do not appear to reduce herbicide efficacy with full use rates. This is because the use rate was established for efficacy using various waters. However in principle to optimize herbicide efficacy, any amount of antagonistic salts will have some effect and to optimize efficacy for all conditions one may wish to consider taking action to overcome even low amounts of antagonistic salt.

Water with high bicarbonate levels may have low levels of other anions like chloride and sulfate. Calcium chloride is also antagonistic and spray water pH should be below 7. Bicarbonate levels greater than 500 ppm may reduce herbicide efficacy of Achieve, Poast, Select, MCPA amine, and 2,4-D amine. When using water with more than 500 ppm bicarbonates the high rate of these herbicides should be used and applied at the most susceptible weed stage for efficacy. Bicarbonate also increases water pH and high bicarbonate levels may also be associated with high water pH (See #1 above). Water bicarbonate levels in MT, ND, and MN range from 200 to 1,000 ppm.

Analysis of spray water sources can determine water quality effects on herbicide efficacy.

Water samples can be tested at:

USPS: NDSU Dept 7680, Fargo, ND 58108-6050,  
UPS and Physical Address: NDSU Soil and Water Laboratory,  
Waldron Hall 202, 1360 Bolley Dr. NDSU, Fargo, ND 58102.  
701 231-7864. Analysis is approximately \$25.00 to \$29.00.



## Herbicide Spray Adjuvants

### Fertilizer

AMS (Dry)	Various	\$0.45 lb	2 to 4 lb/A
AMS (liquid)	Various	\$8.00 gal	2 to 4 qt/A
28% UAN	Various	\$15.00 gal	2 to 4 qt/A
28% UAN (bulk)	Various	\$5.00 gal	2 to 4 qt/A

### Surfactant & AMS Replacement (WCA)

Fastrack	United Suppl.	\$23.00 gal	0.75% v/v
N-Tense	West Central	\$24.00 gal	0.25 to 0.75% v/v
Transport Ultra	Precision Labs	\$24.00 gal	0.25 to 0.75% v/v

### Surfactant

Activate Plus	Winfield	\$22.00 gal	0.25 to 0.5% v/v
Activator 90	Loveland	\$28.00 gal	0.25 to 0.5% v/v
APSA-80	Amway	\$26.00 gal	0.25 to 0.5% v/v
ChemSurf 90	United Suppl.	\$27.00 gal	0.25 to 0.5% v/v
Crnblt Premier 90	West Central	\$22.00 gal	0.25 to 0.5% v/v
Liberate LeciTech	Loveland	\$30.00 gal	0.25 to 0.5% v/v
Pen-A-trate II	Precision Labs	\$28.00 gal	0.25 to 0.5% v/v
Preference	Winfield	\$28.00 gal	0.25 to 0.5% v/v
Protyx	Precision Labs	\$96.00 gal	0.125% v/v
Purity 100	Rosens	\$21.00 gal	0.25 to 0.5% v/v
R-11	Wilbur-Ellis	\$27.00 gal	0.25 to 0.5% v/v
Tradition 93	Rosens	\$20.00 gal	0.25 to 0.5% v/v
Translate	United Suppl.	\$30.00 gal	0.25 to 0.5% v/v
Wet-Sol 99	Schaeffers	\$28.00 gal	0.25 to 0.5% v/v

### Surfactant & AMS & AMS Replacement (WCA)

Flame	Loveland	\$40.00 gal	0.5% v/v
Transport	Precision Labs	\$34.00 gal	0.25 to 0.75% v/v

### Acidic AMS Replacement (WCA)

AMADS - Monocarbamide dihydrogen sulfate or urea + sulfuric acid			
CT-301	Cheltec	\$- gal	8 fl oz/100 gal
ET-4000	MK Ag Service	\$28.50 gal	0.5 to 1% v/v
Cut-Rate	Wilbur-Ellis	\$2.00 lb	3 to 4 lb/100 gal
Hel-Fire	Helena	\$34.00 gal	0.5 to 0.75% v/v
Import	Precision Labs	\$34.00 gal	0.5 to 1% v/v
N Go/N Tank	Adjuvants Plus	\$34.00 gal	0.5 to 1% v/v

### MSO & AMS Replacement (WCA)

SuperCharge	Syngenta	w/Achieve	0.5% v/v
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### NIS Approved for use in Water

Surfactants approved for use in bodies of water are:

Activate Plus	Agridex	BroncPlusDryEDT
Class Act NG	Induce	Level 7
Liberate L-Tech	Preference	R-11
Top Surf	X-77	

### Basic pH Blend

Linkage	West Central	\$19.00 gal	1% v/v
Mycrimix Plus	J.R. Simplot	\$18.00 gal	1% v/v
Quad 7	Loveland	\$18.50 gal	1% v/v

### Surfactant & Silicone

Freeway	Loveland	\$95.00 gal	0.75 to 2 pt/100 gal
Kinetic	Helena	\$105.00 gal	0.75 to 2 pt/100 gal
Silkin	Winfield	\$96.00 gal	0.75 to 2 pt/100 gal
Speed	Precision Labs	\$96.00 gal	0.25 to 2 pt/100 gal
Sur-Plus	United Suppl.	\$87.00 gal	0.5 to 2 pt/100 gal
Sylgard 309	Wilbur-Ellis	\$115.00 gal	0.75 to 2 pt/100 gal

### High Surfactant Oil Concentrate

Between (PO)	United Suppl.	\$15.00 gal	1 to 2 pt/A
Destiny HC (MSO)	Winfield	\$34.00 gal	1 to 2 pt/A
Diplomat (PO)	Rosens	\$11.50 gal	1 to 2 pt/A
Exchange (PO)	Precision Labs	\$22.00 gal	1 to 2 pt/A
High Load (PO)	Wilbur-Ellis	\$24.00 gal	1 to 2 pt/A
Superb HC (PO)	Winfield	\$17.00 gal	1 to 2 pt/A

### Oil Based Surfactant

Trophy Gold	West Central	\$32.00 gal	1 qt/100 gal
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### Surfactant & AMS

Bronc PlusDryEDT	Wilbur-Ellis	\$0.50 lb	10 lb/100 gal
Bronc Total	Wilbur Ellis	\$33.00 gal	0.75 to 1% v/v
Class Act NG	Winfield	\$10.00 gal	2.5% v/v
Deliver	Precision Labs	\$10.00 gal	2.5% v/v
Impressive DB	Rosens	\$0.82 lb	2.25 lb/A
Powerhouse	Rosens	\$7.25 gal	5 to 10 qt/100 gal
Surfate	Loveland	\$14.50 gal	1% v/v
Ultra-Lite	United Suppl.	\$7.00 gal	2.5% v/v
Ultra Surf AMS	United Suppl.	\$10.00 gal	2.5% v/v

### Petroleum Oil Concentrate

Agri-Dex	Helena	\$18.00 gal	2 to 4 pt/A
Herbimax	Loveland	\$18.00 gal	2 to 4 pt/A
Ortech	Rosens	\$7.50 gal	2 to 4 pt/A
Premium Crop Oil	United Suppl.	\$10.00 gal	2 to 4 pt/A
Premium COC	West Central	\$10.00 gal	2 to 4 pt/A
Prime Oil	Winfield	\$10.00 gal	2 to 4 pt/A
Protyx Aerial	Precision Labs	\$22.00 gal	0.5 pt/A
ROC Crop Oil	Wilbur-Ellis	\$11.00 gal	2 to 4 pt/A

### AMS Replacement / Water Conditioning Agent (WCA)

Alliance	Winfield	\$14.00 gal	1.25% v/v
Bronc Max	Wilbur-Ellis	\$24.00 gal	0.5% v/v
Citron	Farm Direct	\$3.25 lb	2.2 lb/100 gal
Cut-Rate	Wilbur-Ellis	\$1.25 lb	4 lb/100 gal
Quest/Request	Helena	\$30.00 gal	0.5% v/v
Speedway	United Suppl.	\$32.00 gal	0.5% v/v
Transport	Precision Labs	\$30.00 gal	0.5% v/v

### Methylated Seed Oil (MSO)

Adigor	Syngenta	w/Axial	9.6 fl oz/A
MSO Leci-Tech	Loveland	\$20.00 gal	1 to 2 pt/A
MSO Ultra	Precision Labs	\$20.00 gal	1 to 2 pt/A
Persist Ultra	J.R. Simplot	\$20.00 gal	1 to 2 pt/A
Premium MSO	Helena	\$20.00 gal	1 to 2 pt/A
Soy-Stik	West Central	\$18.00 gal	1 to 2 pt/A
Succeed	United Suppl.	\$17.00 gal	1 to 2 pt/A
Sundance II	Rosens	\$16.00 gal	1 to 2 pt/A
Superspread MSO	Wilbur-Ellis	\$20.00 gal	1 to 2 pt/A

### AMS & AMS Replacement (WCA)

Alliance	Winfield	\$9.00 gal	1.25% v/v
Bronc Max	Wilbur-Ellis	\$19.00 gal	0.5% v/v
Choice W-Master	Loveland	\$20.00 gal	0.5% v/v
Enact	Rosens	\$18.00 gal	0.5% v/v
Sequester	Hefty	\$20.00 gal	0.25 to 0.5% v/v

### MSO Basic pH Blend

Entro	Various	\$26.00 gal	1 to 2 pt/A
Renegade	Wilbur-Ellis	\$26.00 gal	1 to 2 pt/A

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**MSO & Organosilicone Surfactant**

Air Force	United Suppl.	\$44.00 gal	4 to 6 fl oz/A
Dyne-Amic	Helena	\$51.50 gal	4 to 6 fl oz/A
Rivet	Winfield	\$44.00 gal	4 to 6 fl oz/A
Syl-tac	Wilbur-Ellis	\$55.00 gal	4 to 6 fl oz/A

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**AMS & Drift Retardant**

AMS 20/10	United Suppl.	\$1.60 lb	10 lb/100 gal
Corral AMS Dry	Winfield	\$1.60 lb	10 to 17 lb/100 gal

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**AMS & Defoamer**

Omnix LDF	Precision Labs	\$4.60 gal	2.5 to 5% v/v
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**AMS & Deposition & AMS Replacement (WCA)**

Bronc Max EDT	Wilbur-Ellis	\$39.00 gal	2 to 3 qt/100 gal
Transport Plus	Precision Labs	\$30.00 gal	2 to 4 qt/100 gal

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**AMS & Deposition & Defoamer**

AMS 2000	United Suppl.	\$1.25 lb	10 to 17 lb/100 gal
AmSol Plus	United Suppl.	\$6.00 gal	2.5 gal/100 gal
Arrow Four	Winfield	\$20.00 gal	2 to 4 qt/100 gal
Cornbelt Dri-Gard	West Central	\$1.50 lb	9 lb/100 gal
Cornbelt Gardian Plus	West Central	\$6.50 gal	2.5 gal/100 gal
Double Down	United Suppl.	\$8.00 gal	2.5 gal/100 gal
Drift Guard	Rosens	\$1.32 lb	9 lb/100 gal

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**AMS & Deposition/Retention & Defoamer**

Array	Rosens	\$1.60 lb	9 to 14 lbs/100 gal
Border Xtra DF	Precision Labs	\$1.60 lb	18 lb/100 gal
Border Xtra 4L	Precision Labs	\$5.00 gal	5% v/v
Border Xtra 8L	Precision Labs	\$8.00 gal	2.5% v/v

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**AMS & Surfactant & Deposition/Retention & Defoamer**

One-Ap XL	West Central	\$1.85 lb	9 to 15 lb/100 gal
BroncPlus DryEDT	Wilbur-Ellis	\$1.60 lb	10 lb/100 gal
Pay Off Plus	United Suppl.	\$2.00 lb	10 to 13 lb/100 gal
Zenith	Rosens	\$1.25 lb	1.5 to 2.25 lb/A

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**AMS & Surfactant & AMS Replacement (WCA) & Deposition/Retention & Defoamer**

Veracity	West Central	\$23.00 gal	3 qt/100 gal
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**Surfactant & AMS Replacement (WCA) & Deposition/Retention & Defoamer**

Weather-Gard	Loveland	\$58.00 gal	1 to 2 qt/100 gal
Complete Leci-Tec			

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**AMS Replacement (WCA) & Deposition/Retention & Defoamer**

Cornbelt Gardian	West Central	\$22.00 gal	1 to 3 qt/100 gal
Formula 1	United Suppl.	\$30.00 gal	1 to 3 qt/100 gal
Transport Plus	Precision Labs	\$25.00 gal	1 to 3 qt/A

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**Deposition/Retention - Drift Retardants**

Affect GC	United Suppl.	\$40.00 qt	1 to 2 fl oz/100 gal
Border EG 250	Precision Labs	\$1.00 oz	10 oz/100 gal
Corral Poly	Winfield	\$25.00 qt	4 to 12 fl oz/100 gal
Coverage G-20	Wilbur-Ellis	\$32.00 gal	2 to 4 fl oz/A
Direct	Precision Labs	\$25.00 qt	1 to 4 oz/100 gal
Drift Down	Rosens	\$15.00 qt	4 to 8 fl oz/100 gal
In-Place	Wilbur-Ellis	\$40.00 gal	4 fl oz/pt-lb herbicide
InterLock	Winfield	\$42.00 gal	4 to 6 fl oz/A
Placement	Winfield	\$38.00 gal	4 fl oz/pt-lb herbicide
Shroud II	United Suppl.	\$15.00 qt	10 to 12 oz/100 gal
Syndetic	West Central	\$15.00 qt	2 to 8 oz/100 gal

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**Deposition/Retention & Surfactant & Drift Retardant**

Powerlock	Winfield	\$44.00 gal	5 to 8 oz/Al
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**Drift Retardant & Defoamer**

Compadre Leci-Tc	Loveland	\$66.00 gal	1 pt/100 gal
Sedate	West Central	\$45.00 gal	1 pt/100 gal

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**Acidifying Agents**

Complete	Winfield	\$35.00 gal	1 to 3 pt/100 gal
Indicate 5	United Suppl.	\$48.00 gal	2 to 4 pt/100 gal
LI-700 Leci-Tech	Loveland	\$33.00 gal	2 to 4 pt/100 gal
New Balance	Precision Lab	\$32.00 gal	2 to 4 pt/100 gal
SuperSpread 7000	Wilbur-Ellis	\$32.00 gal	0.5 to 2 pt/100 gal
Tri-Fol	Wilbur-Ellis	\$32.00 gal	0.5 to 2 pt/100 gal

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**Compatibility Agents**

CompatibilityAgent	West Central	\$30.00 gal	1 to 3 pt/100 gal
Complete	Winfield	\$35.00 gal	1 to 3 pt/100 gal
Convert	Precision Labs	\$35.00 gal	1 to 6 pt/100 gal
Embrace	Wilbur-Ellis	\$35.00 gal	1 to 4 pt/100 gal
EZ-Mix	Loveland	\$38.00 gal	1 to 4 pt/100 gal
Mix-All	Rosens	\$35.00 gal	1 to 4 pt/100 gal
Compatibility Plus	United Suppl.	\$41.50 gal	1 to 2 pt/100 gal

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**Spray Tank Cleaners**

Tank Cleaner	Various	\$15-35 qt	1 to 2 qt/100 gal
Tank Cleaner	Various	\$5-7.00 lb	1 to 2 lb/100 gal

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## Dandelion - Weed Of The Year

**Dandelion** is a simple perennial weed that is most associated with undisturbed sites such as lawns and continuous no-till fields. The plant is commonly recognized for its bright yellow flowers and pappus attached to seeds that aid in wind-born movement. Above-ground foliage is arranged in a rosette and the large taproot below the soil surface allows the plant to overwinter and continue growth the following year.

### Methods of Control

#### Mechanical Control:

Dandelion is a problem in reduced or no-till fields. Regular aggressive disturbance of the soil root zone by tillage may decrease establishment of dandelion. No-tillage fields that are infested with a dense population of dandelion may benefit from periodic deep cultivation.

#### Chemical Control:

Herbicide applications of either glyphosate or 2,4-D ester are more effective in the fall than in the spring. Glyphosate applied at 0.75 ae lb/A + AMS at 8.5 to 17 lb/100 gallons water in the fall following crop removal provides approximately 80% control (Table 1). Spring applications are less effective. 2,4-D ester applied at 1 lb ae/A is less effective than glyphosate regardless of application timing. Tribenuron plus glyphosate and/or 2,4-D ester may provide more consistent control of established dandelion. Because of plant regrowth and new seedling emergence, sequential applications of glyphosate applied POST to Roundup Ready corn, soybean, canola, or sugarbeet will be needed to reduce the population of dandelion.

Table 1. Dandelion control rated at planting in spring.

Timing	Glyphosate 0.75 lb ae/A	2,4-D ester 1 lb ae/A
----- % control -----		
EFall	78	60
LFall	82	58
ESpring	65	35
LSpring	58	30

Data averaged over years, 2000-2003.

#### Residual Herbicide Combinations:

Residual herbicides used with glyphosate or 2,4-D can reduce emergence of seedling dandelion and may improve control of established dandelion. Unfortunately, some of these herbicides cannot be used in North Dakota because of their long residual interfering with crop rotation. FirstRate will suppress seedling dandelion and give short-term residual control. Valor can provide seedling dandelion control, however, it will antagonize the control of glyphosate or 2,4-D on established dandelion.

#### POST Dandelion Control:

Table 2 gives some POST herbicides providing some control of dandelion. Herbicides listed in Table 2 must be applied according to label and crop rotation restrictions must be followed. HPPD inhibitor herbicides like Callisto, Impact, and Laudis will initially provide excellent control but regrowth will occur later.

Table 2. POST options for dandelion control.

Glyphosate + NIS + AMS (Fall-applied)	0.75 lb ae/A + 0.25% + 8.5 lb/100 gal	F-G
Glyphosate + NIS + AMS (Spring-applied)	0.75 lb ae/A + 0.25% + 8.5 lb/100 gal	P-F
Glyphosate + NIS + AMS (Spring-applied)	1.5 to 2.25 lb ae/A + 0.25% + 8.5 lb/100 gal	G
Glyphosate + 2,4-D ester + AMS (Fall-applied)	0.75 lb ae/A + 1 pt/A + 8.5 lb/100 gal	G
Glyphosate + 2,4-D ester + AMS (Spring-applied)	1.5 lb ae/A + 1 pt/A + 8.5 lb/100 gal	G
Glyphosate + 2,4-D ester + Valor + AMS	0.75 lb ae/A + 1 pt/A + 2 to 3 oz/A	P-F (Established plants)
Glyphosate + 2,4-D ester + Valor + AMS	0.75 lb ae/A + 1 pt/A + 2 to 3 oz/A	G (Seedling plant)
2,4-D	1 qt/A	P-F
2,4-D + dicamba	1 qt/A + 0.5 pt/A	G
2,4-D + tribenuron	1 qt/A + 0.3 oz/A	F
Curtail	2 to 4 pt/A	G-E
WideMatch	1 to 1.33 pt/A	G-E
Distinct + NIS + UAN	6 oz/A + 0.25% + 2.5%	G
Status + PO + UAN	5 oz/A + 1 qt/A + 2.5%	G
Ignite 280 + AMS	29 to 36 fl oz/A + 3 lb/A	G-E
Liberty + AMS	24 fl oz/A + 3 lb/A	G
Liberty + atrazine + AMS	24 fl oz/A + 1 pt/A + AMS	G
Callisto + atrazine + Oil + UAN	3 fl oz/A + 0.5 pt + 1% + 2.5%	G
Impact + atrazine + Oil + UAN	0.5 to 0.75 fl oz/A + 0.5 pt + 1% + 2.5%	G
Laudis + atrazine + Oil + UAN	3 fl oz/A + 0.5 pt + 1% + 2.5%	G

Dicamba, Callisto, Impact, Laudis, Curtail, Distinct, and WideMatch may leave a residue in the following cropping season and has crop rotation restrictions.

## Summary of new information in the 2009 Weed Control Guide:

NDSU Weed Science home page address at: [www.ag.ndsu.edu/weeds](http://www.ag.ndsu.edu/weeds) - Web version of ND Weed Control Guide.

More herbicides are listed by generic names due to several brand names available. Fluroxypyr, nicosulfuron, thifensulfuron & tribenuron (3:1, 2:1, and 1:1 ratio), metribuzin, others. Pages 82-83.

### Weed Guide changes:

- Weed control ratings - now in front of guide on pages 6-11.

- Herbicide Resistant Weed section (pages 120-121) - revised with important control information and strategies to delay resistance.

- Many generic brand names have been added to the Herbicide Compendium - pages 124-130.

### New Sections Added:

- "Fall or Spring Applied Early Preplant/Preplant Herbicides" - page 12 and 98 to 99.

- "Herbicide Information" - has tables and charts that was previously listed in the paragraph section - pages 76-86.

- Dandelion - Weed of the Year - biology and control information added on pages 73, 98 (B2), and 134.

- Common ragweed - populations resistant to glyphosate are likely in ND and being tested for documentation. Control information has been added on page 115.

- "Understanding a Water Quality Analysis Report" - page 131.

### Glyphosate:

Prices of Monsanto brands around \$65 to \$75/gallon for 4.5 lb ae/gallon concentrations. Prices for generic brands around \$35/gallon for 3 lb ae/gallon concentration. Glyphosate sections on pages 88 to 89 has been revised and more information added.

### Small Grains:

- **Axial XL** (Syngenta) and **Discover NG** (Syngenta) - formulations now include adjuvant.

- **Orion** (Syngenta) = florasulam & MCPA ester.

- **Wolverine** (Bayer) = Puma & Huskie. Registration pending.

- **PowerFlex** (pyroxsulam - Dow) - new ai for control of wild oat, downy brome and suppression of green foxtail. Only winter wheat.

- **GoldSky** (pyroxsulam & florasulam & fluroxypyr - Dow) - New ai's for control of grass and broadleaf weeds. Not for barley.

### Oat:

- **Callisto** (Syngenta) - PRE and POST control of broadleaf weeds.

### Corn:

- **Balance Flexx** (Bayer) = Balance & safener for PRE and EPOST weed control. Registration pending.

- **Valor** (Valent) = approved for EPP application 14 to 28 days prior to planting.

- **Accent Q** (Dupont) = Accent & safener.

- **Require Q** (Dupont) = Resolve & dicamba & safener.

- **Resolve** (Dupont) = Resolve DF formulation.

- **Resolve SG** (Dupont) = Resolve SG formulation.

- **Resolve Q** (Dupont) = Resolve & Harmony GT & safener.

- **Steadfast Q** (Dupont) = Steadfast & safener.

### Soybean:

- **Spartan Advance** (FMC) - Spartan & glyphosate.

- **Spartan Charge** (FMC) - Spartan & Aim.

- **LibertyLink Soybean** - Introduction of Ignite 280 (glufosinate) (2.34 lb ai/gal) herbicide to replace Liberty (1.67 lb ai/gal) for use in LibertyLink corn, soybean, and canola.

### Sunflower:

- **Sharpen** (saflufenacil - BASF) new ai for sunflower desiccation. Registration pending. Labeling in future for soil-applied broadleaf weed control in corn and soybean.

### Flax:

- **Callisto** (Syngenta) - PRE control of broadleaf weeds.

- **Spartan 4F** = Section 18 and 3 registration pending.

### Emerging New Active ingredients:

			<u>Launch</u>
Corvus (thiencarbazone)	Bayer	Corn	2009
Sharpen (saflufenacil)	BASF	Sunflower	2009
Kixor Technology		Corn/soybean	2010
Integrity (saflu + Outlook)	BASF		
Premixes (florasulam)	Dow/Syng	Small grains	2009
Orion, GoldSky			
PowerFlex (pyroxsulam)	Dow	Small grains	2009
KJM 44/MAT 28	DuPont	Pasture/range	2010
Pyroxasulfone	Kumiai	Wht, corn, soy, snfl, pea, others	2010
Raft	Bayer	Sunflower	???

### Emerging Weed Management Traits:

		<u>Launch</u>
Optimum GAT corn	DuPont	2010
Instigate = burndown residual multiple modes of action.		
Optimum GAT soybean	DuPont	2011
Diligent = burndown residual multiple modes of action.		
Traverse and Freestyle = > app timing, no residual, crop safe.		
Dow Herbicide Tolerant (DHT) corn	Dow	2012
DHT soybean	Dow	2013
Dicamba resistant soybean	Mon/U of NE	2013
GlyTol + HPPD + LL	Bayer	2014
Multiple crops		
SmartStax (8 GM traits)	Mon/Dow	????
ACCcase resistant sorghum Kansas St U.	????	
ALS resistant sorghum	Kansas St U.	????
Atrazine resistant sunflower?	Kansas St U.	????

### Potential Section 18 exemptions:

Spartan on Flax.

### IR-4 Residue Studies to be Conducted in 2009:

Wheat	chloantraniliprole -	Fargo (2) Velva (1)
Barley	chloantraniliprole -	Velva (1)
Sorghum	chloantraniliprole -	Fargo (1)
Sorghum	methoxyfenazide -	Fargo (3) Velva (1)
Canola	diquat	Minot (2)
Canola	esfenvalerate	Minot (2)
Flax	cyfluthrin	Velva (3)

### Other IR-4 projects accepted for 2009:

Potato	fenpyroximate
Processing pea	acetochlor (reduced rotational restriction)
ALS sorghum	nicosulfuron & rimsulfuron
ACCcase sorghum	quizalofop

### Possible Future IR-4 Studies:

Millet	thifensulfuron
Safflower	sulfentrazone and thifensulfuron
Sunflower	thifensulfuron (Express resistant)

### Double and Triple Stack Weed Resistance Update:

Horseweed:	Glyt (2000), Glyt + ALS (2003)
C. ragweed:	Glyt (2006), Glyt + PPO (2006), Glyt + PPO + ALS (2006)
Waterhemp:	Glyt (2005), Glyt + PPO + ALS (2006)
Lambsqtr:	Glyt (2006)

### **Quick reference information:**

1. NDSU Weed Science Home Page:  
<http://www.ag.ndsu.edu/weeds/>
  
2. <agdakota> list serve: Timely updates in pesticide registration and crop production information. To subscribe, send email to [r.zollinger@ndsu.edu](mailto:r.zollinger@ndsu.edu)
  
3. U.S. registered pesticide labels:  
<http://www.cdms.net/manuf/manuf.asp>
  
4. North Dakota Department of Ag registered pesticide database:  
<http://www.kellysolutions.com/nd/>
  
5. North Dakota Pesticide Training and Certification Program:  
<http://www.ag.ndsu.nodak.edu/aginfo/pesticid/pesticid.htm>
  
6. SAFETY AND EMERGENCY PHONE NUMBERS:  
    ND Poison Control Line:           800 222-1222  
    ND Emergency Assistance Line:   800 472-2121  
    Report pesticide incident to NDDA: 701 328-2232