EFFICACY AND PROFITABILITY OF DIFFERENT CORN WEED MANAGEMENT TECHNOLOGIES

David W. Fischer and R. Gordon Harvey[1] Professor, Dept. of Agronomy, University of Wisconsin-Madison.

Experiments were conducted at six locations in 2000 and at four locations in 1999. These studies were conducted to expand on findings from research conducted in 1997 and 1998 that suggested the corn hybrid yield potential was the most important factor to consider when making planting decisions. However, earlier research evaluated only one hybrid for each technology and was conducted at only one location. In the interest of space only 2000 results are presented in this paper as 1999 results are printed in the 2000 Fertilizer, Aglime and Pest Management Conference proceedings.

Materials and Methods

Separate field experiments were conducted near DeForest, Baraboo, Watertown, and Arlington. The Baraboo location was used for treatments that are not in an atrazine prohibition area, DeForest was a field with a low weed infestation, the Watertown site evaluated woolly cupgrass and at Arlington three experiments were conducted - one with heavy weed pressure, one with wild-proso millet, and one using no-till planting. Three corn hybrids were planted for each technology at each location and included Garst 8756 RR, DeKalb 493 RR, DeKalb 520 RR, Garst 8773 BLT, Cargill 4150 LL, NX 4217, Pioneer 37J99, Cargill 4111, Garst 8707, and DeKalb 507. Hybrids were chosen with the help of Dr. Joe Lauer and represent the top yielding hybrids from each technology in University of Wisconsin corn evaluation trials in 1998. Returns were determined using herbicide prices set forth in the 2000 Pest Management in Wisconsin Field Crops bulletin (A3646) and a corn price of $2.00/bu.

Weed Control

Very few problems were detected with weed control. A sequential application of Liberty failed to adequately control wild-proso millet, yellow foxtail, and common lambsquarters. Lightning treatments resulted in very poor common ragweed control. Several treatments resulted in reduced redroot pigweed and eastern black nightshade control, however, weed densities were light and the reduced control did not result in reduced yields.

Returns to Management

Corn grain yields were substantially reduced by excessive moisture and frost injury. The top hybrid by treatment combination within each location included Garst 8707 treated with Dual II Magnum and atrazine, NX 4217 treated with Lightning, Pioneer 37J99 treated with Lightning at two locations, DeKalb 493 RR treated with Harness and Roundup Ultra,

Cargill 4150 LL treated with Liberty ATZ, and DeKalb 520 RR treated with Harness and Roundup Ultra. Refer to Tables 1 to 3 for additional treatments that performed similar to these within each location (designated by bold type).

Discussion

As with results from 1999, corn hybrid yield potential was the most important factor to determine profitability. This was even more important in 2000 when recovery from frost or water damaged varied among the hybrids within the trial. Initial inspection of the data would suggest that herbicide resistant technology may be the most profitable for producers to use. This is due to several hybrids that were able to quickly recover from frost or flood damage. As producers make decisions on planting for the 2001

[11] UW-Extension Dane County, 1 Fen Oak Court, Madison, WI 53718 and Emeritus

growing season, unless a hard to control weed such as woolly cupgrass or wild proso millet is present, producers should choose corn hybrids based on performance in yield trials. Several factors that should be considered as these decisions are being made include hybrid yield, standability, cold tolerance, early season vigor and disease resistance. In addition, if no-till practices are going to be used, producers must understand that hybrids perform differently under no-till conditions and this must be taken into account as production decisions, including hybrid selection, are being made.

Table 1. Yields and returns to management at Baraboo.

Treatment[a] Hybrid	Treatment cost	Yield[b] Hybrid	Yield[b] Avg	Returns on weed management cost[b] Hybrid	Returns on weed management cost[b] Avg
	$/A	bu/A		$/A	
The following treatments were applied to Roundup - Ready hybrids.					
Surpass + atrazine +Hornet	$54		**95**		$136
Garst 8756 RR		94		$134	
Dekalb 493 RR		**105**		$157	
Dekalb 520 RR		86		$117	
Roundup Ultra/Roundup Ultra	$43		**97**		$151
Garst 8756 RR		98		$154	
Dekalb 493 RR		**105**		$167	
Dekalb 520 RR		87		$132	
Harness Xtra 5.6L /Roundup Ultra	$44		**95**		$146
Garst 8756 RR		**106**		$168	
Dekalb 493 RR		99		$154	
Dekalb 520 RR		80		$115	
Harness Xtra 5.6L +Roundup Ultra	$37		**96**		**$154**
Garst 8756 RR		94		$151	
Dekalb 493 RR		**107**		$177	
Dekalb 520 RR		86		$134	
The following treatments were applied to Liberty Link hybrids.					
Surpass + atrazine +Hornet	$47		**96**		$144
Garst 8773 BLT		74		$102	
Cargill 4150 LL		**119**		**$191**	
NX-4217		94		$140	
Bicep II Magnum / Liberty + AMS	$43		**95**		$148
Garst 8773 BLT		77		$111	
Cargill 4150 LL		**118**		**$194**	
NX-4217		91		$140	
Liberty ATZ + AMS	$29		**92**		**$156**
Garst 8773 BLT		71		$113	

Cargill 4150 LL		**118**	**$208**	
NX-4217		87	$146	
Liberty + AMS/Liberty + AMS	$24	84		$144
Garst 8773 BLT		65	$106	
Cargill 4150 LL		101	$179	
NX-4217		86	$147	

continued

The following treatments were applied to Clearfield hybrids.

Surpass + atrazine +Hornet	$47		87	$127
NX-4217		80	$113	
Pioneer 37J99		**106**	$165	
Garst 8773 BLT		75	$103	
Lightning + MSO + AMS	$32		80	$128
NX-4217		68	$104	
Pioneer 37J99		**106**	**$181**	
Garst 8773 BLT		66	$100	
Lightning + Prowl + MSO + AMS	$45		88	$130
NX-4217		83	$121	
Pioneer 37J99		**107**	$169	
Garst 8773 BLT		73	$101	
Lightning + Clarity +NIS + AMS	$36		88	$140
NX-4217		76	$116	
Pioneer 37J99		**110**	**$184**	
Garst 8773 BLT		77	$119	

The following treatments were applied to conventional hybrids.

Surpass + atrazine +Hornet	$47		**92**	$137
Cargill 4111		96	$144	
Garst 8707		90	$134	
Dekalb 507		90	$133	
Dual II Magnum + atrazine	$36		**96**	**$157**
Cargill 4111		97	$159	
Garst 8707		101	$166	
Dekalb 507		91	$147	
Frontier/Marksman+28%N	$49		**99**	$149
Cargill 4111		96	$144	
Garst 8707		**110**	$170	
Dekalb 507		91	$134	
Balance + atrazine	$29		**101**	**$174**

Table 1. Returns to management at Baraboo (cont.).

Cargill 4111		98	$168	
Garst 8707		**109**	**$189**	
Dekalb 507		96	$164	
Dual II Magnum+atrazine /Northstar+NIS+28%N	$54	**94**		$134
Cargill 4111		84	$115	
Garst 8707		92	$130	
Dekalb 507		**105**	$157	
Axiom / Distinct +NIS + 28%N	$34	**98**		**$162**
Cargill 4111		90	$147	
Garst 8707		102	$170	
Dekalb 507		101	$168	

continued

Table 1. Returns to management at Baraboo (cont.).

Basis Gold + Prowl + COC+28%N	$33	**92**		$151	
Cargill 4111		87		$141	
Garst 8707		91		$150	
Dekalb 507		98		$163	
Accent + Northstar + COC + 28%N	$36	**98**		**$164**	
Cargill 4111		93		$153	
Garst 8707		98		$164	
Dekalb 507		104		$174	
LSD (0.10) =		14	10	29	20

[a, b, c] See Table 3.

Table 2. Yields and returns to management at Watertown.

Treatment[a]	Trt	Woolly cupgrass Yield[b]		Woolly cupgrass Returns on weed management cost[b]		Wild-proso millet Yield		Wild-proso millet Returns on weed management cost[b]	
Hybrid	cost	hybrid	avg	hybrid	Avg	hybrid	avg	hybrid	avg
	$/A	bu/A		$/A		bu/A		$/A	
The following treatments were applied to Roundup Ready corn.									
Surpass/Accent Gold+ COC+AMS	$65		**121**		$177		123		$181
Garst 8756 RR		111		$157		**135**		$205	
DeKalb 493 RR		121		$177		119		$173	
DeKalb DK 520 RR		**131**		$196		115		$165	
Roundup Ultra/Roundup Ultra	$43		**119**		**$195**		**134**		**$225**
Garst 8756 RR		103		$163		**141**		**$238**	
DeKalb 493 RR		121		$199		129		$215	
DeKalb DK 520 RR		**133**		$222		**132**		**$221**	
Harness/Roundup Ultra	$43		**125**		**$207**		**128**		**$213**
Garst 8756 RR		116		$188		127		$212	
DeKalb 493 RR		128		$212		**130**		$216	
DeKalb DK 520 RR		**132**		$220		127		$210	
Harness+Roundup Ultra	$41		**123**		**$206**		**127**		**$213**

Table 1. Returns to management at Baraboo (cont.).

Garst 8756 RR	106	$172	**135**	**$228**	
DeKalb 493 RR	124	$207	125	$209	
DeKalb DK 520 RR	**139**	**$238**	121	$202	
The following treatments were applied to Liberty Link corn.					
Surpass/Accent	$58	100	$141	115	$173
Gold+COC+AMS					
Garst 8773 BLT	84	$110	97	$136	
Cargill 4150 LL	103	$148	118	$179	
NX 4217	112	$166	**131**	$204	

continued

Table 1. Returns to management at Baraboo (cont.).

Bicep II Magnum/ Liberty+AMS	$43		96		$150		114		$185
Garst 8773 BLT		79		$114		88		$133	
Cargill 4150 LL		103		$164		128		$213	
NX 4217		107		$172		126		$209	
Lightning+MSO+AMS/ Liberty+AMS	$55		103		$150		112		$168
Garst 8773 BLT		88		$121		97		$139	
NX 4217		117		$178		126		$196	
Liberty+AMS/Liberty+AMS	$44		96		$148		111		$179
Garst 8773 BLT		83		$122		94		$143	
Cargill 4150 LL		101		$157		115		$187	
NX 4217		105		$166		125		$207	
Accent+Clarity+MSO+AMS / Liberty+AMS	$54								
Cargill 4150 LL		109		$164		100		$145	
The following treatments were applied to Clearfield corn.									
Surpass/Accent Gold+ COC+AMS	$58		102		$147		120		$181
NX 4217		111		$165		125		$191	
Pioneer 37J99		111		$165		**136**		$213	
Garst 8773 BLT		80		$110		98		$138	
Lightning+MSO+AMS	$31		104		$177		117		$204
NX 4217		108		$185		122		$212	
Pioneer 37J99		122		$214		**137**		**$243**	
Garst 8773 BLT		82		$132		93		$156	
Prowl/Lightning+MSO+AMS	$52		105		$159		113		$174
NX 4217		114		$176		115		$177	
Pioneer 37J99		119		$186		**131**		$210	
Garst 8773 BLT		83		$115		93		$134	
Surpass/Lightning+Clarity+ NIS+AMS	$53		104		$156		115		$176
NX 4217		113		$173		112		$171	
Pioneer 37J99		117		$182		**136**		$219	

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Garst 8773 BLT	83	$114	96	$138	
The following treatments were applied to conventional corn.					
Surpass/Accent Gold+ COC+AMS	$58	109	$165	114	$170
Cargill 4111	112	$166	120	$182	
Garst 8707	108	$158	101	$145	
DeKalb DK 507	106	$171	120	$183	

continued

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Dual II Magnum/Accent+ Northstar+COC+AMS	$56		115		$174		119	$182
Cargill 4111		125		$193		122	$189	
Garst 8707		105		$154		112	$167	
DeKalb DK 507		116		$176		122	$189	
Surpass/Basis Gold+ Clarity+NIS+28%N	$52		111		$175		114	$176
Cargill 4111		115		$178		122	$192	
Garst 8707		109		$166		107	$161	
DeKalb DK 507		109		$180		113	$174	
Harness+Balance	$38		112		$186			
Cargill 4111		119		$199				
Garst 8707		108		$178				
DeKalb DK 507		110		$182				
Balance/Accent Gold+ COC+AMS	$47		112		$177		118	$190
Cargill 4111		118		$189		123	$199	
Garst 8707		107		$167		113	$178	
DeKalb DK 507		111		$175		119	$192	
Frontier / Basis Gold + Clarity + NIS + 28%N	$49		112		$176		116	$183
Cargill 4111		117		$185		126	$203	
Garst 8707		107		$165		108	$167	
DeKalb DK 507		113		$178		114	$178	
Dual II Magnum+Princep 90/ Accent+Beacon+COC+28% N	$66						119	$173
Cargill 4111						127	$188	
Garst 8707						104	$144	
DeKalb DK 507						127	$188	
Distinct+NIS+28%N/ Accent+COC+28%N	$51		111		$171		112	$174
Cargill 4111		114		$178		118	$185	
Garst 8707		107		$162		104	$156	
DeKalb DK 507		112		$173		115	$180	

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Accent+Clarity+NIS+28%N / Accent+COC+28%N	$53	111		$169	118			$182
Cargill 4111	118		$183		118		$183	
Garst 8707	102		$152		108		$163	
DeKalb DK 507	112		$171		127		$201	
LSD (0.10) =	8	6	$16	$13	11	8	$22	$16

[a, b, c] See Table 3.

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Table 3. Yield and returns to management under light weed pressure, heavy weed pressure, and no-till conditions.

Treatment[a]		Arlington - No-till				Arlington - heavy pressure				DeForest			
	Treatment cost	Yield[b]		Returns on weed management cost[b]		Yield[b]		Returns on weed management cost[b]		Yield[b]		Returns on weed management cost[b]	
Hybrid		hybrid	avg	hybrid	avg	hybrid	avg	hybrid	avg	hybrid	avg	hybrid	avg
	$/A	bu/A		$/A		bu/A		$/A		bu/A		$/A	
The following treatments were applied to Roundup - Ready hybrids.													
Surpass + Hornet	$47	134		$222		**154**		$261		**116**		**$185**	
Garst 8756 RR		125		$203		131		$215		104		$162	
DeKalb 493 RR		138		$230		154		$262		**124**		**$202**	
DeKalb 520 RR		140		$233		**176**		$306		**119**		$191	
Roundup Ultra / Roundup Ultra	$43	140		$237		**159**		**$275**		**122**		**$202**	
Garst 8756 RR		120		$198		144		$246		112		$181	
DeKalb 493 RR		146		$249		162		$280		**125**		**$207**	
DeKalb 520 RR		**153**		$264		171		$299		**130**		**$217**	
Harness/Roundup Ultra	$43	141		$238		**159**		**$276**		**122**		**$200**	
Garst 8756 RR		127		$211		139		$234		118		$192	
DeKalb 493 RR		142		$240		164		$285		**121**		**$199**	
DeKalb 520 RR		**153**		$262		**175**		$308		**126**		**$209**	
Harness+Roundup Ultra	$41	141		$241		150		$259		**125**		**$209**	
Garst 8756 RR		127		$212		127		$213		118		$195	
DeKalb 493 RR		137		$236		154		$267		**132**		**$223**	

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

DeKalb 520 RR		**157**		**$274**		169		$297		**124**		**$208**
The following treatments were applied to Liberty - Link hybrids.												
Surpass + Hornet	$40		132		$226		**154**		$268		95		$150
Garst 8773 BLT		119		$199		109		$178		64		$88
Cargill 4150 LL		135		$231		172		$305		103		$167
NX 4217		143		$247		**180**		**$321**		117		$195
Dual II Magnum / Liberty + AMS	$43		127		$212		148		$252		83		$123
Garst 8773 BLT		118		$192		93		$142		59		$74
Cargill 4150 LL		133		$223		**176**		$308		86		$129
NX 4217		131		$220		174		$306		104		$165

Continued

Table 2. Yields and returns to management in woolly cupgrass and wild proso millet fields(cont).

Liberty ATZ+AMS	$29		140		$252		**162**		**$293**		93		$158
Garst 8773 BLT		132		$235		126		$224		67		$105	
Cargill 4150 LL		138		$248		**183**		**$337**		98		$167	
NX 4217		**151**		**$274**		174		**$319**		115		**$201**	
Liberty+AMS/Liberty+AMS	$44		132		$219		**161**		**$279**		89		$134
Garst 8773 BLT		112		$179		127		$210		59		$74	
Cargill 4150 LL		135		$226		**185**		**$327**		93		$142	
NX 4217		149		$253		172		$300		116		$187	
The following treatments were applied to Clearfield hybrids.													
Surpass + Hornet	$40		150		$259		152		$264		103		$165
NX 4217		**155**		**$269**		171		$303		114		$187	
Cargill 4150 LL		**161**		**$281**		**179**		$318		**127**		**$215**	
Garst 8773 BLT		133		$227		105		$170		67		$94	
Lightning+MSO+AMS	$32		148		$265		**153**		$273		97		$162
NX 4217		**164**		**$295**		169		$305		107		$182	
Cargill 4150 LL		145		$259		**188**		**$344**		116		**$200**	
Garst 8773 BLT		136		$240		101		$171		68		$103	
Lightning+Prowl+MSO+AMS	$45		149		$254		147		$249		103		$162
NX 4217		**165**		**$286**		174		$302		117		$190	
Cargill 4150 LL		**165**		$263		168		$291		**121**		$196	

Table 3. Yield and returns to management under light weed pressure, heavy weed pressure, and no-till conditions (continued).

Garst 8773 BLT		129		$214		100		$154		72		$99
Lightning+Clarity +NIS+AMS	$33		143		$253		**156**		**$279**		104		$176
NX 4217		**161**		**$288**		169		$305		120		**$207**
Cargill 4150 LL		143		$254		**183**		**$334**		**124**		**$215**
Garst 8773 BLT		125		$217		116		$199		69		$106

continued

Table 3. Yield and returns to management under light weed pressure, heavy weed pressure, and no-till conditions (continued).

The following treatments were applied to conventional hybrids.

Surpass + Hornet	$40		151		$262		143		$246		109		$178
Cargill 4111		**156**		**$272**		138		$237		115		$190	
Garst 8707		148		$256		157		$274		103		$165	
DeKalb 507		148		$257		134		$228		109		$178	
Dual II Magnum + atrazine	$36		**163**		**$289**		144		$252		101		$167
Cargill 4111		**164**		**$292**		137		$238		97		$159	
Garst 8707		**165**		**$295**		157		$277		104		$172	
DeKalb 507		**159**		**$281**		139		$241		103		$171	
Frontier/Marksman+28%N	$49		**156**		$263		143		$238		105		$162
Cargill 4111		**158**		**$268**		136		$223		108		$167	
Garst 8707		**161**		**$272**		153		$258		103		$157	
DeKalb 507		149		$249		140		$232		105		$162	
Balance + Axiom	$35		146		$257		119		$204		110		**$186**
Cargill 4111		149		$263		115		$195		114		$193	
Garst 8707		149		$264		127		$219		110		$184	
DeKalb 507		139		$244		116		$197		107		$180	
Dual II Magnum / Northstar+NIS+28% N	$50		**152**		$255		147		$243		99		$149
Cargill 4111		148		$246		145		$240		106		$163	
Garst 8707		**157**		**$265**		155		$260		90		$130	
DeKalb 507		**151**		$253		140		$230		101		$153	

Table 3. Yield and returns to management under light weed pressure, heavy weed pressure, and no-till conditions (continued).

Axiom / Distinct+NIS+28% N	$34	**155**	**$276**	140	$246	**116**		**$198**
Cargill 4111		**155**	**$276**	135	$237	118	**$201**	
Garst 8707		**154**	**$274**	150	$266	112	$191	
DeKalb 507		**156**	**$277**	134	$234	117	**$201**	

Table 3. Yield and returns to management under light weed pressure, heavy weed pressure, and no-till conditions (continued).

continued

Basis Gold + Prowl + COC + 28%N	$33	143	$252	139	$243	110	**$188**					
Cargill 4111	149	**$265**	135	$236	111	$189						
Garst 8707	133	$233	149	$264	107	$181						
DeKalb 507	146	$257	132	$230	113	$194						
Accent + Northstar + COC + 28% N	$36	**156**	**$278**	145	$254	112	**$188**					
Cargill 4111	**156**	**$277**	142	$248	**120**	**$203**						
Garst 8707	**156**	**$277**	155	$274	107	$178						
DeKalb 507	**157**	**$279**	138	$240	109	$182						
LSD (0.10) =	15	11	30	23	13	9	25	18	13	12	26	25

[a] Treatments were applied at recommended labeled rates. Additives: NIS is Activate Plus®, and COC is Prime Oil®, both by Riverside/Terra; AMS (ammonium sulfate) is S-Sul Sprayable® by American Plant Food Corp.; 28%N is an aqueous nitrogen solution containing urea and NH_4NO_3.

[b] **Bold** text indicates treatments similar to top yielding or top returning treatment.

[c] If needed treatment not applied.