

Carfentrazone-ethyl activity on aquatic weeds and wild rice tolerance in Minnesota - 2000.

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Application Data

Site	Aitkin	Deer River	Grand Rapids
Date	6/22/00	6/27/00	6/27/00
Air Temp (°F)	65	68	60
Soil Temp (°F)	--	61	
Sky	cloudy	partly cloudy	partly cloudy
Wind (mph)	WNW 2-5	W 4-6	W 0-1
Relative Humidity (%)	65	50	68
Water Depth (inch)	0-6	0 (saturated)	10-12
<b>Wild Rice</b>			
Size (inch)	11-16	--	18-24
Stage	3-4 leaf	--	early tiller
<b>Equisetum</b>			
Size (inch)	--	12-24	--
Stage	--	vegetative	--
<b>Giant Burreed</b>			
Size (inch)	--	24-26	--
Stage	--	early bloom	--
<b>Common Water Plantain</b>			
Size (inch)	8-14	--	--
Stage	4-8 leaf	--	--
<b>Rush</b>			
Size (inch)	--	12-16	--
Stage	--	full bloom	--

Common water plantain pressure was heaviest in the shallow areas of the paddy where the water was 0-6 inches deep at application. Common water plantain scapes were just beginning to emerge at the time of herbicide application. No significant stand reduction was visible on wild rice in the study area (Table 1). Wild rice height was variable and no significant growth reduction was apparent. The highest efficacy of common water plantain was achieved with treatments  $\geq 0.2$  lb of carfentrazone-ethyl, all applied with 0.25 lbs ai 2,4-D amine/ac. The addition of 2,4-D did improve the efficacy of carfentrazone-ethyl on common water plantain without increasing wild rice injury. Fewer common water plantain seeds were produced on carfentrazone-ethyl or carfentrazone-ethyl + 2,4-D treated plants than on plants treated with 2,4-D alone. The addition of 2,4-D to carfentrazone-ethyl did not always improve

plantain seed reduction compared to carfentrazone-ethyl used alone. It appears that the targeted rate for control of common water plantain should be 0.2 lb ai carfentrazone-ethyl + 0.25 lbs 2,4-D.

There was no standing water at the time of herbicide application to giant burreed in the fallowed paddy. Therefore, efficacy may have been greater than expected when lower giant burreed leaves may be covered by standing water at application during wild rice production. The addition of 2,4-D to carfentrazone-ethyl did not appear to consistently improve the efficacy of the carfentrazone-ethyl on giant burreed (Table 2). It appears that carfentrazone-ethyl reduced flower and seed production of giant burreed at all rates tested with or without the addition of 2,4-D. For control of giant burreed, 0.1 lb ai/ac carfentrazone-ethyl gave adequate suppression and the addition of 2,4-D did not appear to improve performance when evaluated on July 19. By September 19, the control with carfentrazone-ethyl treatments had decreased and it is apparent that even the 0.05 lb. rate of carfentrazone-ethyl may be adequate. Control of giant burreed was highest with rates of carfentrazone-ethyl  $\geq$  0.1 earlier in the season, and trends show that performance was best with 0.2 lb carfentrazone-ethyl by the September 19th rating. Therefore, the target rate of carfentrazone-ethyl should be 0.2 lb ai for suppression of giant burreed. The addition of 2,4-D appears not to be beneficial unless other species are present that are susceptible to 2,4-D. It appears that carfentrazone-ethyl has a low level of activity on broadleaved arrowhead, equisetum, softstemmed bulrush, and *Carex* spp. The *Carex* species showed significant necrosis with all carfentrazone-ethyl treatments and were injured more than the other non-target species present. It appears that 2,4-D used alone resulted in little injury on any non-target species. By the September 19 ratings, there was very little injury apparent on these non-target species so the injury would be temporal and likely not cause a long-term reduction in population density of these species.

Wild rice stands and plant height were variable at the time of herbicide application and when rated, typical of cultivated wild rice. There were no visible impacts of any of the herbicide treatments in wild rice stand or height on the July 19 rating (Table 3). Leaf necrosis was present in all wild rice plots. There did not appear to be any significant, long-term leaf necrosis or wild rice injury due to carfentrazone-ethyl. Total yield and grain yield did not show any reductions due to herbicide treatment.

In summary, it appears that the target rate for control of common water plantain would be 0.2 lb carfentrazone-ethyl + 0.25 lb 2,4-D dimethylamine and the target rate for suppression of giant burreed would be 0.2 lb carfentrazone-ethyl with the addition of 2,4-D optional depending on weed species present. Acknowledging the limitations of the single location and environment in which the tolerance study was conducted, there appears to be no significant concerns for tolerance of wild rice for up to 0.4 lb carfentrazone-ethyl tank mixed with 0.25 lb 2,4-D. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Carfentrazone-ethyl activity on common water plantain in wild rice at Aitkin, MN - 2000. (Becker et al.)

Treatment	Rate (lb ai/A)	July 19			
		Wild Rice		Common Water Plantain	
		Growth Reduction		Seedhead Reduction	Control
		----- (%) -----			
Carfentrazone	0.2	0		86	68
2,4-D dimethylamine	0.25	0		52	50
Carfentrazone + 2,4-D dimethylamine	0.05 + 0.25	3		96	83
Carfentrazone + 2,4-D dimethylamine	0.1 + 0.25	0		90	78
Carfentrazone + 2,4-D dimethylamine	0.2 + 0.25	0		97	90
Carfentrazone + 2,4-D dimethylamine	0.3 + 0.25	1		99	98
Carfentrazone + 2,4-D dimethylamine	0.4 + 0.25	1		98	94
Untreated		0		--	--
LSD (0.05)		ns		10	10

Table 2. Carfentrazone-ethyl activity on giant burreed in wild rice at Deer River, MN - 2000. (Becker et al.)

Treatment	Rate (lb ai/A)	Giant Burreed						
		Flower Inhibition			Control (7/19)			
		7/19	7/19	9/19	Arrowhead	Equisetum	Rush	Sedge
		----- (%) -----						
Carfentrazone	0.2	100	71	62	2	34	31	69
2,4-D dimethylamine	0.25	64	30	20	0	9	0	18
Carfentrazone + 2,4-D dimethylamine	0.05 + 0.25	100	58	56	1	21	4	66
Carfentrazone + 2,4-D dimethylamine	0.1 + 0.25	97	71	57	0	28	12	81
Carfentrazone + 2,4-D dimethylamine	0.2 + 0.25	100	77	76	21	41	32	80
Carfentrazone + 2,4-D dimethylamine	0.3 + 0.25	99	70	60	14	30	25	81
Carfentrazone + 2,4-D dimethylamine	0.4 + 0.25	95	78	72	16	43	32	78
Untreated		--	--	--	--	--	--	--
LSD (0.05)		16	22	14	18	15	21	28

Table 3. Carfentrazone-ethyl tolerance on wild rice at Grand Rapids, MN - 2000. (Becker et al.)

Treatment	Rate (lb ai/A)	Wild Rice			
		7/19		9/8	
		Growth Reduction	Necrosis	Total Yield	Grain Yield
		----- (%) -----			
Carfentrazone	0.2	18	8	260	162
2,4-D dimethylamine	0.25	29	9	212	130
Carfentrazone + 2,4-D dimethylamine	0.05 + 0.25	30	7	242	150
Carfentrazone + 2,4-D dimethylamine	0.1 + 0.25	31	13	258	158
Carfentrazone + 2,4-D dimethylamine	0.2 + 0.25	34	12	211	128
Carfentrazone + 2,4-D dimethylamine	0.3 + 0.25	16	8	265	166
Carfentrazone + 2,4-D dimethylamine	0.4 + 0.25	39	14	217	136
Untreated		26	4	288	180
LSD (0.05)		ns	ns	ns	ns