

Influence of Glyphosate Rate, Application Date, and Spray Volume on Cattail Control

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Common cattail (*Typha latifolia*) and narrow-leaved cattail (*Typha angustifolia*) grow in monospecific or intermixed stands (3). The two species are presumed to have interbred to produce the extremely robust hybrid *Typha glauca*. Cattails are perennial hydrophytes commonly associated with marshes, lake edges, drainage ditches, and other wetlands in North Dakota. Cattails are part of the natural habitat for wetland ecology. However, cattail infestations may reduce water movement in drainage ditches and reduce oxygenation and microbial activity in lakes and wetlands.

Cattail control is difficult due to the large rhizome system that enables the plant to reestablish rapidly after top-growth is killed. Several carbohydrate depletion techniques such as mowing, crushing, burning, and discing have been used to control cattail, but with limited success (1). Herbicides provide the most effective control method. Glyphosate [*N*-(phosphonomethyl)glycine] (tradename Rodeo) at 1.5 and 3 pounds acid equivalent per acre applied at the early flowering stage provided 93 and 98 percent cattail control, respectively, 10 months after application. However, control declined to 63 and 93 percent, respectively, 14 months after application.

Comes and Kelly (2) reported that glyphosate at 3 pounds per acre provided 96 percent stand reduction when applied in mid September. Cattail control with glyphosate at 3 pounds per acre was not influenced by spray volume. Also, glyphosate applied in mid to full bloom controlled cattail less than when cattail were mature.

The objective of this research was to evaluate cattail control with glyphosate applied at three rates, two spray volumes and three application dates.

Two experiments to evaluate glyphosate (tradename Rodeo) for cattail control were established in drainage ditches near Fargo and West Fargo in 1987. The plots were 10 by 30 feet in a randomized complete block design with glyphosate rate, spray volume, and application date in a factorial arrangement with four replications. Glyphosate at 1.5, 2.3, and 3.0 pounds per acre plus X-77 surfactant at 0.5 percent volume-to-volume was applied in 8 and 24 gallons per acre total volume on June 19, July 27, and September 3, 1987. Treatments were applied with a backpack sprayer using two Spraying Systems OC01 nozzles by walking 30 feet parallel to the ditchbank while extending the sprayer boom over the cattail in the drainage ditch.

Treatments were applied at 8 gallons per acre by walking twice parallel to the plot and at 24 gallons per acre by walking six times. Cattail control was determined by visual evaluations compared to an untreated control on June 22 and August 22, 1988, and on June 28, 1989 (0 percent control = no visible density reduction; 100 percent control = no live stems visible).

Results and Discussion

The variances of the data were not homogeneous for cattail control at Fargo and West Fargo on June 22, 1988, so

the data were not combined. The cattail stand at West Fargo was older and more uniformly established than at Fargo, which may explain the higher variability of control at the Fargo location. Data collected on August 22, 1988 and June 28, 1989 were homogeneous, so these data were combined over locations.

Cattail control on June 22, 1988 at West Fargo averaged over application date and spray volume was 93 percent or greater (Table 1). On the same date at Fargo, cattail control with glyphosate at 2.3 and 3.0 pounds per acre was similar at 90 and 95 percent, respectively, but cattail control with glyphosate at 1.5 pounds per acre was reduced to 68 percent. Cattail control on August 22, 1988 averaged over application date, spray volume, and Fargo and West Fargo locations was 76 percent or greater.

Cattail control declined substantially between August 22, 1988 and June 28, 1989 (Table 1). Cattail control on June 28, 1989 was 67 percent with glyphosate at 3 pounds per acre and declined to 43 percent with glyphosate at 1.5 pounds per acre. The rank order for most to least effective for cattail control was glyphosate at 3.0, 2.3, and 1.5 pounds per acre. Cattail control by late June 1990 was too low for reliable visual evaluation, and herbicide retreatment would have been required to maintain effective water flow in the drainage ditch.

Glyphosate usually controlled cattail better when applied at 3 pounds per acre than 2.3 pounds per acre (Table 1), but the increased control by the additional herbicide probable was not cost-effective. Glyphosate (Rodeo formulation) currently costs approximately \$23 per pound and is labeled for cattail control at 2.3 to 3.0 pounds per acre, so lowering the rate by 0.7 pounds per acre reduces costs by \$16 per acre.

One possible weakness of this research was that glyphosate was applied to long narrow plots, so encroachment of cattail rhizomes from untreated plants adjacent to the plots may have contributed to rapid cattail reestablishment. Perhaps glyphosate at 1.5 pounds per acre would provide adequate control when

Table 1. Cattail control on three dates with glyphosate (Rodeo) at three rates, two application dates, and two spray volumes at West Fargo and Fargo.

Main effects	6/22/88		8/22/88	6/28/89
	WF ^a	Fargo	WF+Fargo	WF+Fargo
	----- % control -----			
Glyphosate rate (lb/A) ^b				
1.5	93	68	76	43
2.3	96	90	88	57
3.0	97	95	93	67
LSD (0.05) over date and volume	2	8	4	6
Application date				
June 18	91	86	83	50
July 27	97	88	89	61
Sept 3	97	79	85	59
LSD (0.05) over rate and volume	2	NS	4	6
Spray volume (gpa)				
8	94	83	85	55
24	95	86	87	58
LSD (0.05) over rate and date	NS	NS	NS	NS

^aAbbreviation: WF, West Fargo.

^bGlyphosate was applied with X-77 surfactant at 0.5% v/v.

encroachment from untreated plants is prevented by treating the entire drainage ditch or marsh. Costs would be reduced \$18 per acre by applying glyphosate at 1.5 pounds per acre rather than at 2.3 pounds per acre.

Cattail control on June 22, 1988 averaged over glyphosate rate and spray volume at West Fargo was less when glyphosate was applied on June 18 than on July 27 or September 3 but was not influenced by application date at Fargo (Table 1). Cattail control averaged over Fargo and West Fargo locations on August 22, 1988 and June 28, 1989 was less from glyphosate applied on June 18 than on July 27. Cattail control tended to be better when glyphosate was applied on July 27 than September 3. These data suggest that cattail control is best when glyphosate is applied in late July to early September.

Spray volume did not influence cattail control when averaged over glyphosate rate and application date (Table 1). Applying 8 gallons per acre rather than 24 gallons per acre would require less surfactant and water and fewer time delays to refill sprayers, so application costs would be further reduced.

Conclusions

Cattail control was good to excellent with glyphosate at 2.3 and 3 pounds per acre and was fair with glyphosate at 1.5 pounds per acre. The best application time appears to be from late July to early September. Spray volume did not influence cattail control, but using 8 gallons per acre rather than 24 gallons per acre would reduce surfactant and application costs.

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