

IRRIGATION OF BENTGRASS WITH FLURIDONE TREATED WATER¹

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INTRODUCTION

Fluridone, 1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl]-4(1H)-pyridinone, was registered by the Environmental Protection Agency for use as an aquatic herbicide under Experimental Use Permit (EUP) in 1981 and fully registered in 1986. Under the EUP a waiting period of 7 days after fluridone application to 10% or less of lakes, and 150 days after whole pond application was required before the water could be used for irrigation. A waiting period is not required under current labeling. Since fluridone is effective for managing economically important aquatic weeds such as hydrilla [*Hydrilla verticillata*, (L.F.) Royle], it is an important aquatic herbicide. However, because it is active on a broad spectrum of herbaceous plants and can persist in pondwater for 2-12 months (West *et al.*, 1983), concern has been expressed over using water for irrigation immediately after whole-pond applications of fluridone (Langeland and Warner, 1986). This study was designed to evaluate the effects of irrigating bentgrass (*Agrostis palustris* Huds.) with water from ponds that had been treated with fluridone for aquatic weed control.

MATERIALS AND METHODS

The 4 lb/gal aqueous suspension formulation of fluridone (Sonar A.S.) was applied to a 0.28 ac (0.11 ha) pond in Clayton, NC on April 10, 1985 at 1.0 lb ai/ac (1.11 Kg/ha). A handgun was used to apply the herbicide in 100 gal (379-l) spray volume that contained 0.15% polyacrylamide copolymer (0.50% Poly-Control). The pond averaged 5.0 ft (1.5m) in depth and was heavily infested with proliferating spikerush (*Eleocharis baldwinii* [Torr.] Chap.).

The 5% pelleted formulation of fluridone (Sonar 5P) was applied to a 2.7 ac (1.1 ha) pond in Raleigh, NC on the same date with a hand-held centrifugal spreader, at 1.0 lb ai/ac (1.11 Kg/ha). The pond averaged 5.0 ft (1.5m) in depth and was moderately infested with proliferating spikerush. Water exchange in both ponds was negligible. Water temperatures ranged from 63 F (17 C) at the beginning of the sampling period to 73 F (23 C) at the conclusion 23 days after.

Water from these ponds was used to irrigate Penncross creeping bentgrass turf at the North Carolina State University Turfgrass Field Center (Cecil gravelly, sandy loam; humic content 0.4%, CEC 3.5, pH 5.1). Pondwater was collected four times at 5-day intervals beginning immediately, 1, 3, and 7 days after herbicide application; and three replicate 36 sq ft (3.3 sq m) turf plots were irrigated with 0.3 in (0.76 cm) of water at each collection time. All plots received additional 0.3 in of irrigation during routine management operations. Immediately after application of the herbicide, water samples were collected from 1 ft (0.3 m) below the water surface in mid-pond. Thereafter complete mixing was assumed and water was collected from

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the pond-edge. One-liter aliquots of water at each irrigation time were frozen for later fluridone residue analysis. Fluridone analysis was conducted by Lilly Research Laboratories, Greenfield, Indiana.

Bentgrass was examined weekly for 12 weeks for aberrant growth compared to plots that did not receive fluridone treated water.

RESULTS AND DISCUSSION

The calculated concentration of fluridone in water at the rate used in this study was 74 ppb (0.2 lb/ac-ft). One sample, which was collected immediately after application of Sonar A.S., exceeded this concentration (Table 1). This concentration is indicative of "hot spots" that can occur soon after surface application, especially at the water surface. One day after application, fluridone concentration decreased to less than 50% of the calculated concentration, and continued to decrease to less than 25% after 23 days in the Sonar A.S. treated pond. Concentrations of fluridone in this pond were probably decreased after uptake by the dense population of proliferating spikerush.

Fluridone concentrations in the Sonar 5P treated pond (Table 1) were comparatively lower than in the Sonar A.S. treated pond. This is consistent with previous observations (Langeland and Warner, 1986; West *et al.*, 1983). Similar to the A.S. treated pond, the concentration was higher immediately after application and then decreased; but then increased after 11 days. The lower concentrations following application of the pelleted formulation suggests that using this product should minimize the potential for damage to turf after application of fluridone to irrigation ponds. However, if the pelleted formulation is used, irrigation intakes should not be located on the pond bottom where the highest fluridone concentrations will likely occur.

Some discoloration of bentgrass occurred in two of the plots that were irrigated with water collected immediately after application of Sonar A.S. to the pond. This was observed as two small patches of chlorosis, typical of fluridone symptoms, that appeared about 2 weeks after the first irrigation. The discoloration lasted for 2 weeks, after which permanent damage was not observed. These effects probably reflect the high surface concentration that was observed immediately after application of the Sonar A.S. Other effects of irrigating established bentgrass with fluridone treated water were not observed over a 12 week period.

TABLE 1. CONCENTRATIONS OF FLURIDONE (PPB) IN PONDWATER AFTER APPLICATION OF SONAR A.S. AND SONAR 5P AT A RATE OF 1 LB AI/AC (1.11 KG/HA) TO PONDS OF 5 FT (1.5M) AVERAGE DEPTH.

Days After Application	Fluridone	
	Sonar A.S.	Sonar 5P
0	131	10
1	26	6
3	29	—
5	30	5
6	30	4
7	31	8
8	—	8
10	20	9
11	25	9
12	20	—
13	22	12
14	—	14
15	21	13
16	15	15
18	—	16
21	—	13
23	15	—

Fluridone was applied to ponds in this study at the maximum label rate for 5 ft depth. Higher application rates can be used for greater water depth but equivalent concentrations should occur. Fluridone concentrations ranging from 15-26 ppb in the Sonar A.S. treated pond, and 4-16 ppb in the Sonar 5P treated pond were not phytotoxic to Penncross creeping bentgrass under the irrigation schedule used. However, based on the observation of slight fluridone symptoms in relation to the initial measured fluridone concentration after application of Sonar A.S., this study suggests that at least one day should elapse before using pondwater for irrigating sensitive plants after surface application of maximum rates of Sonar A.S. This is to avoid irrigation with water of potentially phytotoxic concentrations of fluridone that can occur, especially at the water surface, with uneven application, and before the herbicide has had sufficient time to mix in the water column.

LITERATURE CITED

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