CARFENTRAZONE IN COMBINATION WITH 2,4-D FOR THE CONTROL OF EURASIAN WATERMILFOIL (*Myriophyllum spicatum*) AND PARROTFEATHER (*Myriophyllum aquaticum*). C.J. Gray[1], J.D. Madsen[1], R.M. Wersal[1], and K.D. Getsinger[2], [1]Mississippi State University, Mississippi State, MS; and [2]U.S. Army Engineer Research and Development Center, Vicksburg MS.

ABSTRACT

Invasive plants degrade aquatic ecosystems throughout the United States. These weedy species destroy fish and wildlife habitat and interfere with water uses and ecological processes. Currently, there are only eight herbicides labeled for use in aquatic sites. In order to control newly introduced invasive plants and implement resistance management stewardship, additional chemistries and active ingredients need to be developed for managing aquatic and wetland systems. Carfentrazone-ethyl is being evaluated and holds promise for control of aquatic plants.

In a preliminary experiment, results from outdoor mesocosms (Lewisville, TX) suggested only moderate control of the invasive species Eurasian watermilfoil (*Myriophyllum spicatum* L.) and parrotfeather [*M. aquaticum* (Vell.) Verdc.] when carfentrazone-ethyl was used alone. Two experiments were conducted in Starkville, MS to evaluate the efficacy of carfentrazone-ethyl in combination with 2,4-D in outdoor mesocosms. Treatments in the first experiment consisted of carfentrazone (100 µg ai L^{-1}) and 2,4-D (1.0 mg ae L^{-1}) applied alone and in combination (carfentrazone:2,4-D = 100:0.25, 100:0.5, 100:1.0 and 100:2.0) and an untreated control. Treatments in the second experiment consisted of carfentrazone (150 and 200 µg ai L^{-1}) and 2,4-D (0.1 mg ae L^{-1}) and in combination (carfentrazone:2,4-D = 100:0.1) and an untreated control. Visual herbicide efficacy ratings were assessed based on a scale of 0 (no control) to 100% (death of plant) and growth of shoot biomass were collected at 3 weeks after treatment (WAT).

In the first experiment, Eurasian watermilfoil control 1 WAT was more than 90% for all treatments containing a combination of carfentrazone and 2,4-D. Carfentrazone and 2,4-D alone 1 WAT controlled Eurasian watermilfoil 82 and 78%, respectively. Eurasian watermilfoil control was 100% 3 WAT for all treatments except carfentrazone alone (70%). Parrotfeather control 1 WAT was at least 90% for all treatments except 2,4-D alone (72%). At 3 WAT, parrotfeather control was 100% for all treatments with the exception of carfentrazone alone (70%). Shoot biomass of both species were collected for only carfentrazone alone and the untreated control due to complete control obtained from all other treatments; however, shoot biomass for both Eurasian watermilfoil and parrotfeather (0.9 and 1.8 g/pot) were lower compared to the untreated control (1.7 and 10.0 g/pot).

In the second experiment, Eurasian watermilfoil control 1 WAT was 95% for all treatments with the exception of 2,4-D alone (55%). At 3 WAT treatment, Eurasian watermilfoil control with 2,4-D alone decreased to 43%, while control with respect to all other treatments had increased to at least 98%. Parrotfeather control 1 WAT was at least 90% for all treatments except 2,4-D alone (62%). Parrotfeather control with 2,4-D 3 WAT decreased to 53% while all other treatments were statistically the same, with control ranging from 88 to 100%. Only the combination of carfentrazone and 2,4-D controlled both species 100% 3 WAT. Eurasian watermilfoil biomass was not decreased with 2,4-D alone when compared to the untreated control. The decrease in 2,4-D control of both species may be attributed to the decreased rate used and also the decrease in water temperature.

Results from these studies suggest carfentrazone applied with 2,4-D will completely control both Eurasian watermilfoil and parrotfeather. Eurasian watermilfoil control may be obtained using a carfentrazone rate of 150 µg ai L^{-1} or greater. Carfentrazone applied alone initially controlled parrotfeather; however, tissue viability 3 WAT indicated that plant recovery was likely.