Cuban Bulrush Biotype Response to Herbicide Treatments in Florida Field Locations – Year 1 Report

A Report to the Florida Fish and Wildlife Conservation Commission

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BACKGROUND

To date, most research regarding Cuban bulrush (*Oxycaryum cubense*) control has focused on the biotype or form with a single seed head (monocephalous biotype; *O. cubense* forma *paraguayense*) and ignored the biotype with an umbellate seed head (*O. cubense* forma *cubense*). Both Cuban bulrush biotypes are present in FL but unfortunately biotype is not recorded prior to herbicide applications so it is impossible to look at historical FWC treatment records to determine if biotype is the cause of variable levels of control observed in FL populations. Evaluating chemical control strategies on distinct populations of each biotype should provide the information needed to determine if each biotype responds similarly or differently to chemical control methods used in FL.

The objectives of this project are to:

- Investigate short and long-term (8 and 52 WAT, respectively) response of FL field populations of both Cuban bulrush biotypes to herbicide treatments.
- Investigate latitudinal effects of herbicide treatments on populations of both Cuban bulrush biotypes in FL.

- Monitor short and long term regrowth of non-target species in field sites.

METHODOLOGY

Research sites were selected on Lake Fannie, Lake Rousseau, Flying Eagle Preserve, Orange Lake, Lake Talquin, Lake Carr, and Deer Pointe Reservoir (Figure 1). Four treatment plots and a reference plot were delineated in each waterbody (35 plots total). Prior to herbicide treatment, one biomass sample was harvested from each plot to establish a baseline of plant growth. Percent cover of all plant species within a plot was recorded. Biomass was harvested by placing a 0.1 m^2 PVC frame in each plot and harvesting all biomass within the frame. Biomass was shipped overnight to Mississippi State University (MSU) for processing. At MSU, inflorescences were counted in each sample, then samples were separated into emergent and submersed biomass, placed in labeled paper bags, and dried at 70C in a forced air oven for 5 days. After drying, biomass weight was measured and recorded.

Herbicide treatments were administered late summer 2021 (Table 1). Eight weeks after treatment (WAT), the percent cover of plants in each plot was recorded and five biomass samples per plot were harvested, shipped to MSU, and processed in the same manner as pre-treatment samples. Data collection will occur again in summer 2022 to determine long term effects of herbicides on Cuban bulrush and the native plant community.

A mixed model analysis of variance (ANOVA) using herbicide treatment as a fixed effect and lake as a random effect was conducted to assess Cuban bulrush biomass response to herbicide treatments 8 WAT. If differences were detected, a Fishers LSD test was utilized to

separate treatment means (R Core Team 2021). All statistical tests were conducted at the alpha = 0.05 significance level.

RESULTS AND DISCUSSION

All herbicide treatments reduced Cuban bulrush emergent biomass ($p=0.0109$) 87 to 99% compared to reference plants 8 WAT (Figure 2). Submersed biomass was reduced 70 to 85% compared to reference plants 8 WAT ($p=0.0026$; Figure 2). Final biomass assessment will occur in summer 2022. Visual assessment of treatment plots suggests that plots treated with triclopyr may be degrading faster than those treated with other herbicides. Assessment of the plant community in each plot will occur summer 2022.

CONCLUSIONS

- All herbicide treatments provided reduction of Cuban bulrush biomass 8 WAT.
- Final biomass harvest will determine long term effects of herbicide treatments used in this trial.
- There were no differences in biotype response to herbicide treatments.
- Assessment of the plant community will determine if any of the herbicides used here provided selective control of Cuban bulrush.

LITERATURE CITED

R Core Team. 2021. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Www.R-project.org/. Date Accessed: 12-1-2021.

TABLES AND FIGURES

Table 1. Herbicide treatments administered to Cuban bulrush plots in Florida; each treatment included 0.5% v:v NIS.

HERBICIDE	RATE
Reference	-
Triclopyr	192 oz/ac
Diquat	96 oz/ac
FPB	1.35 oz/ac
Glyphosate + Flumioxazin	120 + 3 oz/ac

Figure 1. Image identifying Florida lakes used for treatment plots.

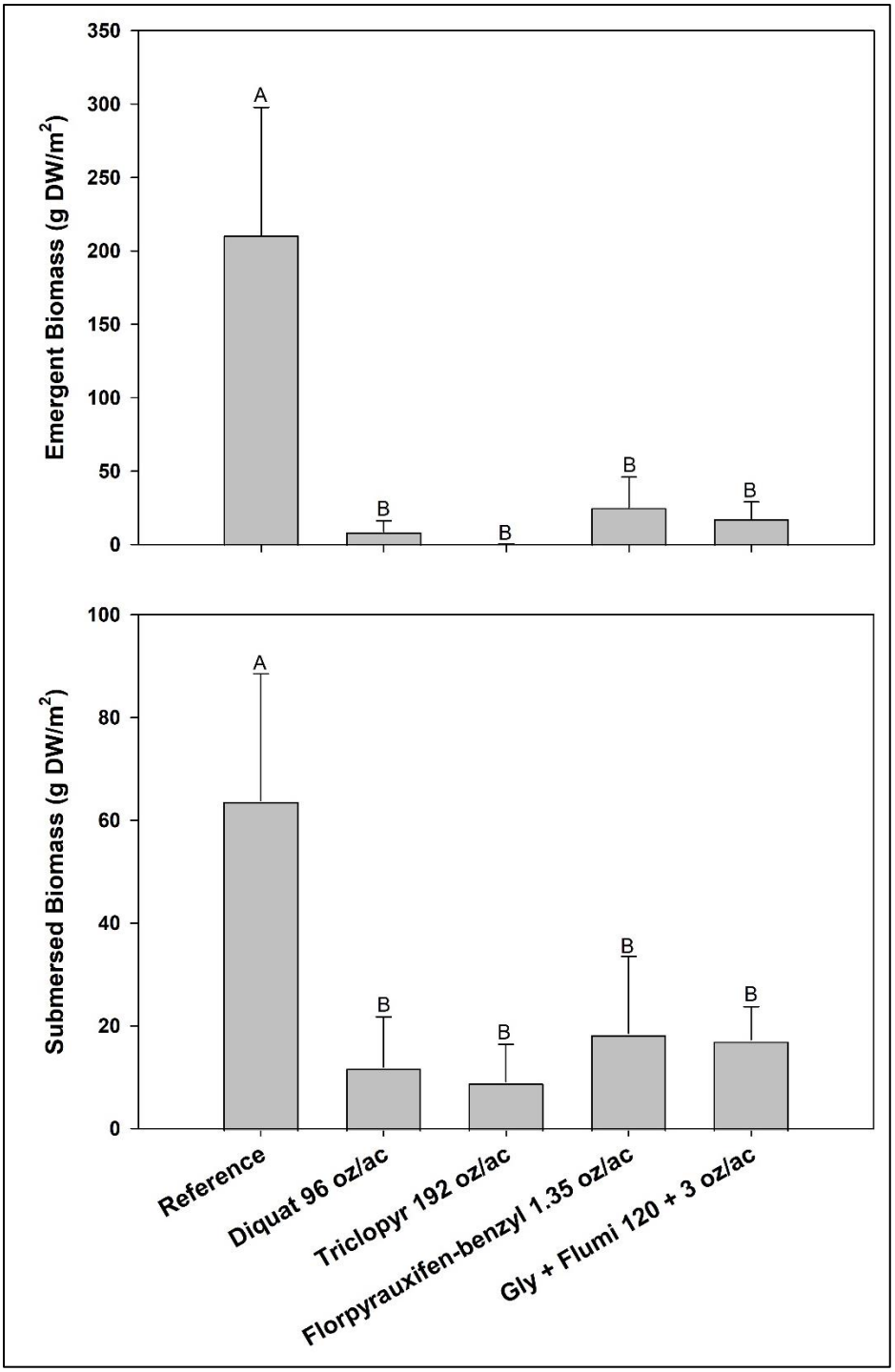

Figure 2. Emergent (top panel) and submersed (bottom panel) Cuban bulrush biomass 8 WAT; error bars are one standard error of the mean; bars sharing a letter are not different at the alpha = 0.05 significance level.