

# Evaluation of Herbicides for Control of buffelgrass and Kleberg bluestem

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**Abstract** Buffelgrass and Kleberg bluestem have been used extensively for erosion control and forage plantings in south Texas, but these aggressive exotic species create monocultures that limit habitat availability for wildlife. Once established, they can dominate a site and commonly reduce native plant species richness and subsequently, wildlife use. Control of these grasses using herbicides is difficult and often requires multiple applications to achieve even modest results. Verdict 520® and Clincher SF® herbicides containing the active ingredients Haloxyfop and Cyhalofop will be applied in experimental trials at four rates of 50, 100, 200, 400 g AE/HA to buffelgrass and Kleberg bluestem monocultures. Herbaceous canopy will be estimated using 20 x 50 cm quadrants, and will be used to determine percent canopy cover before, and at several intervals following treatment. We will also randomly select 5 plants per plot, mark them semi-permanently, and count tillers to determine individual plant mortality or injury caused by the herbicide applications. Experimental plots were mowed prior to spraying to ensure similar growth stage of all plants. Results of the study will hopefully provide a method of reestablishing native forbs and legumes in areas dominated by monocultures of buffelgrass and Kleberg bluestem.

## Introduction

Exotic grass invasions pose a serious threat to biodiversity in Texas and the southwestern United States. Two grasses in particular, Kleberg bluestem and buffelgrass are extremely aggressive and have invaded millions of hectares in southern Texas, leaving extensive portions of wildlife habitat unusable. Flanders et al. (2006) found that birds (32%) and arthropods (60%) were more abundant on sites with native vegetation than those dominated by exotic grasses such as buffelgrass.

Kleberg bluestem and buffelgrass are native to southern Asia and Africa. They were introduced into Texas in the early 1930's to increase biomass production for cattle and reduce soil erosion. But their ease of establishment and rapid propagation have allowed them to spread uncontrolled along roadsides and other disturbed areas. Today, buffelgrass has been planted or invaded approximately 4 million hectares in south Texas, 6 million hectares in Mexico, and 7.5 million hectares in Australia (Cox et al. 1988). It also occupies more than 90% of seeded rangeland south of San Antonio (Mayeux 1983).

Both grasses are resistant to drought, fire, heavy grazing, and most herbicides, which makes their control challenging. This is due in part to large stem bases and crowns that store carbohydrate reserves and ensure regrowth (Dixon 2002). Most herbicide studies conducted to control Kleberg bluestem and buffelgrass have been unsuccessful or short lived (Tjelmeland et al. 2008), but no published studies have been conducted to evaluate grass specific herbicides on these two species.

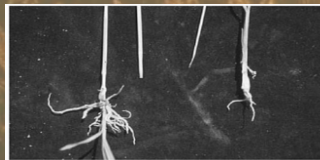
## Study Objective

To evaluate two new grass-specific herbicides (Verdict 520®, (haloxyfop), and Clincher SF®, (cyhalofop) on the control of Kleberg bluestem and buffelgrass.



## Herbicide Selection

Verdict 520®, (haloxyfop), and Clincher SF®, (cyhalofop), are grass-targeting, post-emergence lipid biosynthesis inhibitor test herbicides. The herbicides are applied to unstressed, rapidly growing plants where they inhibit the enzyme acetyl-coenzyme A carboxylase (ACCase) in the lipid biosynthesis pathway. This prevents fatty acid formation needed for plant lipid synthesis. Due to the lack of production of lipids (a constituent of cell membranes) there is no new cell growth, resulting in plant death. This herbicide only acts on the ACCase enzyme in grass species, but does not impact dicots. Monocot specific herbicides such as these may facilitate native forb establishment and growth, potentially increasing habitat suitability for wildlife.



The effect of lipid biosynthesis inhibiting herbicide on the meristematic region of grass roots. Left: Unsprayed control; Right: Necrotic tissue of grass, lack of root development 10 days after treatment. (Monaco, Weller, and Ashton 2002).



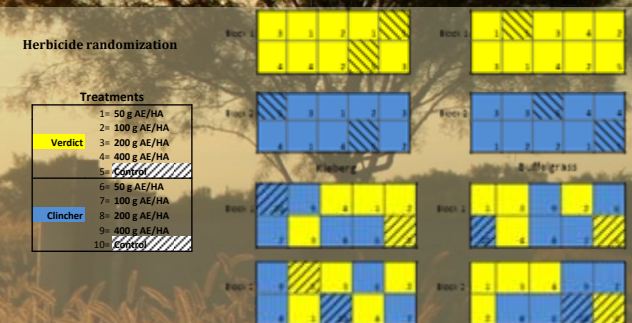
Kleberg Bluestem 3 weeks after herbicide application.

## Study Site

Our study site is near Cotulla, Texas in La Salle County. Study pastures were selected for their high densities of Kleberg bluestem and buffelgrass.

## Methods

The experimental design was a randomized block design, with four blocks, 2 in Kleberg bluestem and 2 in buffelgrass. Within each block, treatments of 50, 100, 200, 400 g AE/HA of haloxyfop and cyhalofop, and a control are replicated twice. Herbaceous plant canopy cover and bare ground was estimated using a 20 x 50 cm sampling frame. Plant densities were counted within a 1 m<sup>2</sup> frame. Five plants per plot were randomly selected, and tillers were counted to determine individual plant mortality or injury.



## Herbicide Application

Herbicides were applied during September and November following preliminary sampling. A model T4 Co<sub>2</sub> backpack sprayer with a 5 ft boom, 3 ft above ground was used to ensure coverage of plants with herbicide. Late September spraying conditions were 22° C, 10 MPH, 83 % humidity, and 26° C, 3 MPH and 70% humidity avg. Early November spraying conditions were 21° C, 4 MPH wind, and 61% humidity avg.

## Results

Data collection and analysis are ongoing.

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