



Evaluating Aerial Application of Herbicides for Buffelgrass Control

Over the past ten years, the economic and ecological threats created by the invasion of buffelgrass in southern Arizona have resulted in serious concerns for the future health of the Sonoran Desert ecosystem. The consensus of local citizens, public officials and government agencies is that we need to act quickly and immediately to control buffelgrass. Despite the best efforts of volunteers and increased efforts of federal agencies and local jurisdictions, control activities have not been able to keep pace with the rapid expansion of buffelgrass.

Background

- Buffelgrass is widespread and able to colonize both disturbed and undisturbed sites; it forms large, continuous, monoculture patches that are doubling in size every 2-7 years.
- Buffelgrass has already infested thousands of acres in the Tucson Basin.
- Buffelgrass is increasing faster than ground-based efforts (pulling and spraying herbicides) are able to control it.
- Buffelgrass has spread into steep, rocky, remote areas where inaccessibility makes it difficult/impossible and unsafe to send field crews.
- Buffelgrass is competing with native plants for resources and prohibiting native species establishment. Research has shown that as buffelgrass patches become larger and denser, native plant diversity and abundance declines.
- Buffelgrass is creating a major fire hazard; is threatening public safety; harming the plants and animals of the

Sonoran Desert including the iconic saguaro cacti; and impacting the tourism based economy of southern Arizona.

- Buffelgrass biomass can equal one to four tons per acre; this amount of biomass or fuel load, has the potential to carry fires in an ecosystem not adapted to fire.

Ongoing Research

In response to these challenges, several research projects are currently evaluating alternative control methods.

Herbicide Trials

Glyphosate is currently the only known herbicide that is effective on buffelgrass. Glyphosate is non-selective and can damage a wide variety of plants. Trials are being performed to evaluate other herbicides that may be more specific to buffelgrass and less harmful to native plants.

Helicopter Application of Herbicides

Two experiments were conducted in the summer of 2010 to evaluate the use of helicopters and specialized equipment to apply glyphosate to treat large and remote infestations of buffelgrass. The following partners worked collaboratively to design, plan, implement, and analyze the experiments: Pima County Natural Resources, Parks & Recreation, Saguaro National Park, US Forest Service, City of Tucson, Bureau of Land Management, University of Arizona, and Southern Arizona Buffelgrass Coordination Center.

Boom Sprayer

Experimental plots were located in Tucson Mountain Park and were sprayed in August 2010. The objectives were to:

- Determine if a helicopter using a boom sprayer can safely navigate steep, saguaro-dominated terrain.
- Evaluate the effectiveness of two



Aerial spray of herbicide with a boom sprayer

different concentrations of glyphosate herbicide (1.34 and 2.66 pounds acid equivalent/acre [lbs ae/ac]) and two different application rates (5 and 10 gallons/acre [gal/ac]) on buffelgrass.

- Determine the effects of glyphosate on non-target native vegetation.
- Measure the amount of herbicide drift outside the target location.

Twelve one acre plots were marked for treatment. Before spraying, monitoring transects were established in each plot and in adjacent untreated control plots. Over 1,600 individual native plants and 1,200 buffelgrass plants were marked for long-term monitoring. Post-treatment vegetation monitoring has been conducted for two years and the analyses are ongoing. To view the experimental plan go to www.buffelgrass.org and click on the research tab.

Results from the first year of post-treatment monitoring indicate that the higher concentration of glyphosate (2.66 lbs ae/ac) at either a 5 or 10 gal/ac application rate can significantly reduce buffelgrass greenness while saguaros and cacti were unaffected. Large woody species were susceptible to minor damage (~10-20%) at higher concentrations and lower application rates. Smaller woody species like

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Aerial spot spray application for precision

brittle bush, limber bush and mallows were most susceptible of natives present, also at higher concentration and lower application rate. While the areas tested had a high density of native vegetation, this technology will be deployed in areas where buffelgrass dominates and most of the native vegetation is no longer present.

To minimize drift large droplets were used and wind speeds were within the herbicide labels specifications (often upper limits are around 10 mph). There was no substantial drift at 75 feet away from spray plots. To investigate drift further, the measured conditions and type of equipment used during the project were entered into a computer model. The modeling exercise indicated that drift resulted in 1% of the application rate at 90 feet downwind.

Spray Ball

The second experiment took place in Ironwood Forest National Monument during September 2010. The objectives were to:

- Evaluate the use of a specialized piece of equipment called a spray ball that is suspended from a helicopter on a cable.
- Determine if the spray ball safely negotiate challenging topography and dense saguaro stands.
- Evaluate accuracy of treating small patches of buffelgrass.
- Measure the amount of drift that the spray ball produces outside the target location.
- Evaluate the equipment's effectiveness at treating small patches of buffelgrass.

Eight sites were selected to represent a variety of topographic locations, varying densities of saguaros, and different sized patches of buffelgrass. The operation was documented with photographs and video. The spray ball was found to be able to come within six feet above the ground and spray an area as small as 12 feet in diameter. Because the objectives were to evaluate the equipment, no herbicides were used. Therefore, no follow up monitoring is required.

More Information

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Helicopter pilot negotiating difficult terrain

Working Partners include:



THE UNIVERSITY OF ARIZONA



www.buffelgrass.org

One-year post treatment greenness for plants treated with different combinations of glyphosate and application rates

