# AN INTEGRATED APPROACH TO ERADICATE SWEET RESIN BUSH (*Euryops subcarnosus vulgaris*) ON THE SANTA RITA EXPERIMENTAL RANGE IN SOUTHERN ARIZONA

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## INTRODUCTION

- Sweet resin bush (*Euryops subcarnosus vulgaris*) is a low-growing, South African shrub that was introduced in several areas of southern Arizona during the 1930's to provide livestock forage and to control soil erosion. The shrub is currently known to infest several thousand acres in southern Arizona.

- In 1997, the Natural Resource Conservation Service (NRCS) discovered a core infestation and several satellite populations of sweet resin bush scattered across approximately 154 acres on the Santa Rita Experimental Range (SRER), located 56 km south of Tucson. Due to the invasive nature of the shrub, an integrated weed eradication project was initiated on the SRER in 1999 by the NRCS, the University of Arizona, the Arizona State Lands Department, and the U.S. Fish and Wildlife Service (USFWS). Prior to eradication treatments, consultation was made with the USFWS to develop guidelines to protect the federally listed endangered Pima pineapple cactus (*Coryphantha sheerii* var. *robustispina*).

## OBJECTIVES

- Eventually eradicate sweet resin bush on the SRER

- Monitor for changes in species density, cover, and composition, and for potential reinvasion of sweet resin bush in the study area

- Ensure that eradication efforts do not harm the endangered Pima pineapple cactus

## METHODS

- Prior to applying eradication treatments, a USFWS survey was conducted to detect individual Pima pineapple cactus plants in and around the area infested with sweet resin bush.

- In January 1999, we established a total of 24, 15m$^2$ permanent plots in grazed and ungrazed areas that were ocularly estimated to contain either heavy or slight infestations of sweet resin bush (SRB), or that contained no SRB (controls). Baseline data on plant density and canopy cover were collected from the permanent plots prior to eradication treatments.

- In February 1999, Americorp volunteers hand-grubbed SRB using picks and shovels. Picloram (Tordon) was applied (1 qt ai/acre) to soil areas where SRB was grubbed to control for germination and seedling establishment in subsequent years. Herbicide was not used on SRB plants growing within 30m of any Pima pineapple cactus plant as required by USFWS treatment protocol. Density and canopy cover data were collected in 2000 and compared to 1999 baseline data.

## RESULTS

- Twenty-one Pima pineapple cactus plants were detected as scattered individuals around the edges of the core SRB infestation prior to 1999 eradication treatments.

- Removal of SRB apparently allowed some native plants species to increase in density, while others decreased in density from 1999 to 2000 (Figs. 1-5).

- Canopy cover data were used to compute relative species composition in 1999 (pre-eradication) and 2000 (post-eradication). Eradication treatments resulted in relatively less SRB, and more native grasses and forbs (i.e., herbaceous layer = *HL), and woody (*W) plants (Figs 7-12).

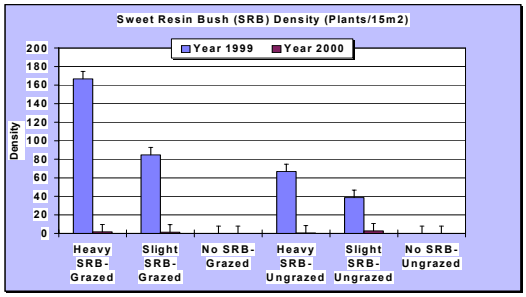



Figure 1. Initial eradication treatments greatly reduced SRB density in both grazed and ungrazed areas from 1999 to 2000.

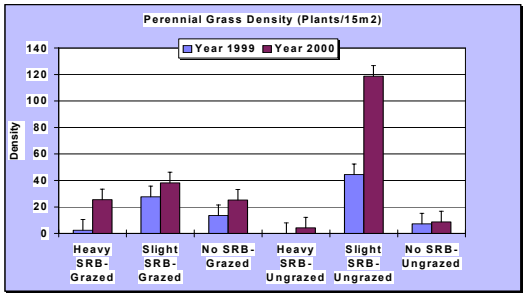



Figure 2. Perennial grass density increased dramatically in ungrazed areas after slight SRB infestations were removed, and increased modestly in all grazed areas.

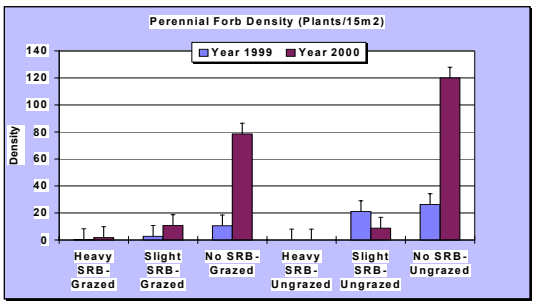



Figure 3. Perennial forb density increased substantially in both grazed and ungrazed control plots (i.e., no SRB).

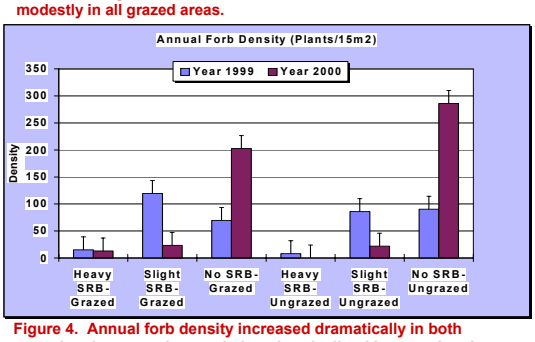



Figure 4. Annual forb density increased dramatically in both grazed and ungrazed control plots, but declined in grazed and ungrazed plots after slight SRB infestations were removed.

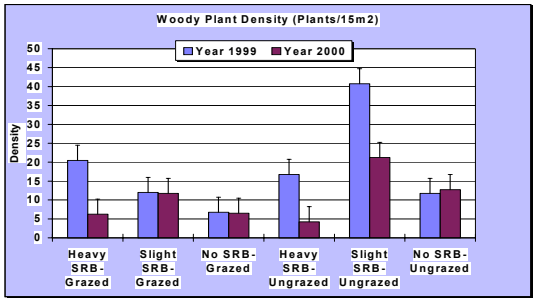



Figure 5. Woody plant density (other than SRB) declined in grazed and ungrazed areas where heavy infestations of SRB were removed, and in ungrazed areas where slight levels of SRB were removed.

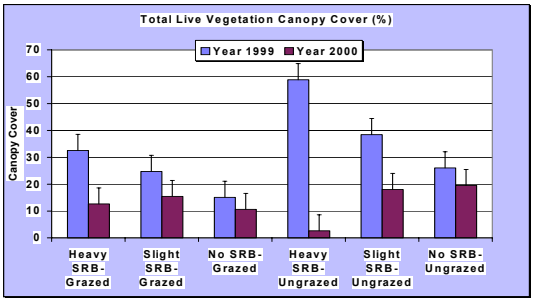



Figure 6. Total live vegetation canopy cover declined substantially in sampling areas that were previously heavily infested with SRB (see photo).

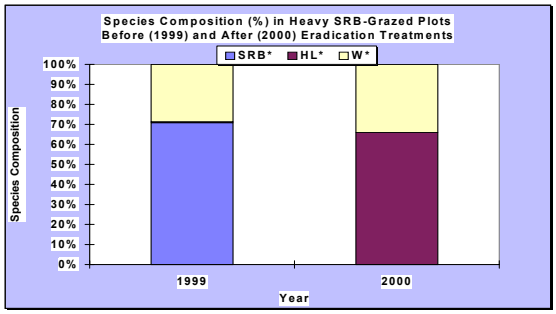



Figure 7. In heavily infested grazed plots, SRB eradication caused species composition to shift to relatively more herbaceous plants, with about the same proportion of woody plants from 1999 to 2000.

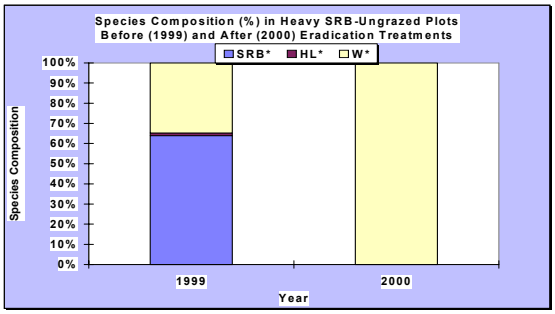



Figure 8. In heavily infested ungrazed plots, SRB eradication resulted in a species composition shift consisting of 100% woody plants.

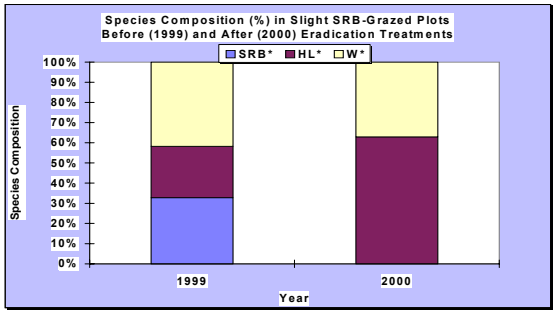



Figure 9. In slightly infested grazed plots, SRB eradication resulted in relatively more herbaceous plants, with about the same proportion of woody plants.

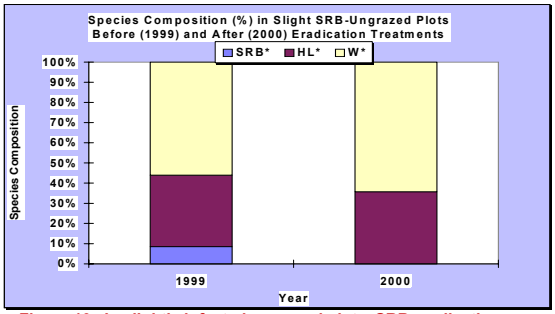
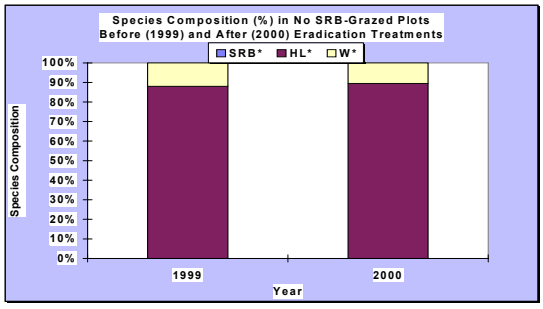
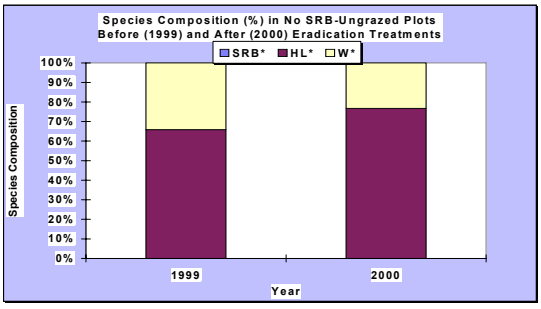



Figure 10. In slightly infested ungrazed plots, SRB eradication resulted in a slightly higher proportion of woody plants, with about the same proportion of herbaceous plants.




Figures 11 and 12. In grazed and ungrazed control plots, species composition remained about the same from 1999 to 2000.

## CONCLUSIONS

- Although 1999 eradication treatments drastically reduced SRB density and canopy cover, we detected many seedlings in 2000 (and in 2001), which illustrates the importance of conducting follow-up monitoring when dealing with invasive plants.

- We will continue to intensively monitor the study plots and the surrounding area for at least 2 more years to evaluate the effectiveness of our initial treatments, and to plan additional eradication efforts as needed.

- Extensive survey efforts for both SRB and the Pima pineapple cactus are planned on the SRER for at least 10 more years.