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# **Low-Impact, Selective Herbicide Application Techniques to Control Sweet Resinbush in Arizona**

**A Preliminary Field Guide by  
Doug Parker and Clare Hydock**



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# Low-Impact, Selective Herbicide Application Techniques to Control Sweet Resinbush in Arizona

## Purpose

The purpose of this preliminary field guide is to describe low-impact, selective herbicide application techniques that were evaluated for control of sweet resinbush (SRB) shrubs and seedlings at a site in the Upper Verde Valley. Herbicides, such as picloram and clopyralid, are considered to be selective because they can control the target species while having little or no effect on desirable grasses and other nonsusceptible plants. In some cases, selectivity also can be achieved by using spot application to target shrubs and avoiding getting any of the spray on adjacent native species. Improving conditions for revegetation by resident native plants may avoid the need for costly restoration. However, it must be understood that susceptible nontarget plants can be damaged or killed if they are inadvertently sprayed or if their roots absorb the active ingredients from the soil.

Based on the initial herbicide applications in January 2003 and follow up monitoring through February 2004, we have determined that satisfactory control results (over 90 percent) can be achieved if the described spray equipment, herbicide mixtures, and application techniques are followed. It must be emphasized that the recommendations in this field guide are preliminary and further testing may result in improvements.

## Background

Sweet resinbush (*Euryops subcarnosus vulgaris*) is an exotic, perennial, desert shrub that belongs to the sunflower family (*Asteraceae*). It is one of almost 100 species of *Euryops* that are native to the arid regions of southern Africa. Sweet resinbush is considered to be an invasive species in Arizona.

The common name for this shrub, "sweet resinbush," comes from the sweet, but disagreeable, odor of the flowers and the drops of resin that form on the woody stems. Mature shrubs are about 2 to 3 feet tall with bright green, succulent foliage that is clearly visible during the winter and spring months when the plants are actively growing. The leaves are small, about an inch long, and are divided into three to five lobes. Shrubs produce an abundant crop of small, yellow, daisy-like flowers during the winter growing season. The abundant flowers develop into a bountiful seed crop from March to May. The seeds have hairy coverings that can attach to the fur of animals or the clothing of people leading to long-distance dispersal, although most of the relatively heavy seeds drop to the ground around parent plants. The hairs absorb water and transform into a gelatinous mass around the seed. After drying, this coating possibly prevents water loss from the seed and may be a factor in extending seed viability in the soil. Seeds begin to germinate the following winter season and germination can continue for more than 5 years, although the total length of time the seeds will remain viable in the soil is unknown. During the hot and dry summer months or periods of drought, plants cease growing and shed their leaves.

This exotic shrub was introduced into Arizona in the 1930's because it was believed the plant could tolerate drought, provide forage for livestock, help protect soils from erosion, and reproduce readily from seed. Plantings were done at several test sites in the State, but the program was abandoned within a few years and the introductions forgotten. It was not until about 50 years

later that it was realized that populations had expanded, developed into pure stands in some areas, and replaced native vegetation. Contrary to expectations, it has been found that SRB is not used by livestock or wildlife for forage, and it eliminates native vegetation on heavily infested sites, exposing bare soil and increasing the potential for erosion. Honey bees and other insects use the flowers as a food source during winter months, but this may be the only beneficial attribute of the species. Since no natural biological controls are present in the State, it appears the only factor that can stress or kill plants is drought. This invasive species, therefore, has the potential to significantly increase its populations, and infestations pose a severe threat to native ecosystems.

Although no record has been found describing the introduction of SRB in the Upper Verde Valley, the initial planting most likely occurred in the late 1930's on a site about 3 miles south of Cottonwood, Arizona, near the junction of Camino Real and Ogden Ranch Road (Forest Service Roads 355 and 359). The site is dry with poor soil conditions, and the native vegetation is dominated by velvet mesquite (*Prosopis velutina*) and broom snakeweed (*Cutierrezia sarothrae*). It appears that SRB seedlings were planted along soil berms near the roadway in an attempt to control erosion. By 2001, the infestation had spread and covered a total area of about 30 acres with about 21 acres on the Prescott National Forest and about 9 acres on adjoining private lands. Scattered plants were found as far as 2 miles from the main infestation.

Prescott National Forest specialists became aware of the infestation in the early 1990's, but they decided it was relatively small and did not appear to pose a significant threat to resource values and uses. They became concerned, however, when homes began to be built along the northern portions of the infestation and the possibility of the town of Cottonwood annexing a portion of the Federal land in a future land exchange. They realized there was a potential for long distance seed dispersal due to the increase in vehicle and human traffic. In response to the threat, an environmental assessment was done to analyze the various treatment methods, including a combination of mechanical mowing, hand pulling and grubbing, and herbicidal techniques. A decision was made to implement a 10-year program to attempt to eradicate the infestation using a combination of Integrated Vegetation Management (IVM) methods. The proposal included treating the infestation on private lands with prior approval from landowners. Private landowners have not provided their approval as of April 2004, but continuing efforts in conjunction with the Arizona Department of Agriculture were planned to attempt to control the infestation on private lands. This guide describes the results of treatments done on the Prescott National Forest.

## **Management Options**

Maintaining and improving the health of native plant communities and protecting rangelands and watersheds from the adverse affects from invasive species are important priorities for Federal and State resource managers and private landowners. To be successful, managers must develop an overall long-term strategy and implement an IVM approach, which usually involves employing a combination of methods to achieve effective, economical, and environmentally sound management. The importance of developing a long term management strategy during the planning phases of a program cannot be overemphasized. Programs need to be designed to achieve the overall objective. For example, to achieve eradication of the SRB infestation in the Upper Verde Valley, it was decided that all shrubs would need to be treated each year during the growing season to prevent any plant from producing seed, and the treatments would need to continue for possibly 10 or more years until there were no viable seeds left in the soil.

A discussion of the various treatment methods that can be considered for SRB control follows:

- **Manual Removal** (selective). Immature plants (about 2 feet tall or less) can be controlled by hand pulling, especially in loose soils or following rainfall. Large, mature shrubs are difficult to remove by hand, and it is almost impossible to hand pull mature shrubs from compacted and rocky soils. Grubbing of the aerial portions and plants and a portion of the root crown just below the soil surface is another effective method and will work for any size plant and any soil condition.

An advantage of manual removal is that the methods are selective and will have minimal impact on desirable plants, and it can also be done at any time of the year. Manual removal of shrubs on sites immediately adjacent to streams, ponds, or where there are other environmental concerns, may be the only acceptable control method available. Disadvantages of using manual methods are that the work can be physically demanding and time consuming, and it can be prohibitively expensive to remove large numbers of shrubs, unless done by volunteers.

- **Mechanical Removal** (nonselective). Mowers and graders can provide effective and economical control of SRB, especially for dense infestations where there are little or no desirable plants present. Treatments should remove most of the aerial portions of plants as close to the soil surface as possible to provide acceptable results. Removal of mature shrubs appears to stimulate seed germination, and this may hasten depletion of the seed bank. Mechanical removal is not an acceptable approach for scattered infestations, since the technique is nonselective and desirable plants can be killed. The use of heavy equipment also can cause soil disturbance that can inhibit restoration of the site by some resident plant species. Fortunately, some native species, such as velvet mesquite, have the ability to sprout following mechanical treatments.
- **Burning** (nonselective). An attempt was made in July 1999 to use fire to treat the infestation in the Upper Verde Valley. Individual shrubs were ignited with a Terra-torch on about 6 acres, but it was not possible to get the fire to move through the infestation due to insufficient fine fuels. Although some shrubs were killed, the use of fire proved to be too costly for the minimal level of control that was achieved. On sites with sufficient fine fuels to carry the fire, burning may be a viable option to remove shrubs, but it must be understood that seed source will persist.
- **Herbicides** (selective). Although it appeared that herbicides might provide the best approach for SRB control, little information was found to help determine what herbicides, application methods, etc., would provide acceptable results. A decision was made to use a mixture of Tordon 22K (picloram) and Reclaim (clopyralid) because these products are known to provide excellent control of species belonging to the sunflower family. Backpack application was expected to be the best method for controlling scattered shrubs. On relatively open sites with hundreds of seedlings per square foot, it was necessary to conduct a broadcast application with an ATV mounted power sprayer.

## Foliar Spray Method

### Treatment Timing

The recommended window to treat SRB shrubs is from mid November through late February when plants are actively growing before seed set. Picloram and clopyralid are readily absorbed by the foliage, and the active ingredients accumulate at the growing sites in plants and inhibit growth processes. Herbicidal symptoms are slow to appear, and it can take a month or longer for plants to start to die, but seed production can be prevented.

Importantly, treatment of mature shrubs should never be attempted during dry periods when plants have ceased growth, especially if they have shed their leaves. Control effectiveness may be greatly diminished under such conditions.

Since seedlings do not produce seeds, spraying can be done at any time from fall through spring when seedlings are actively growing. Seedlings appear to be highly susceptible to both herbicides, and residual control may be achieved for several months due to the persistence of picloram in the soil. Although untested, it may be possible to treat seedlings during the summer months following monsoon rains if the seedlings are green and actively growing.

## Spraying

To treat individual shrubs with backpacks or power sprayers, wet the foliage from the top of the shrubs downward being sure to cover all of the growing tips. It will usually be necessary to spray shrubs from two or more sides to ensure uniform coverage. The foliage should be sprayed until the leaves glisten, but not to the point of dripping.

For broadcast application of dense stands of shrubs or mats of seedlings, wetting of the foliage needs to be done in a similar manner.

## Mixing

For individual plant treatments with backpacks or a power unit with a spray gun, add 1.5 percent of Tordon 22K, 0.5 percent Reclaim, and 0.5 to 1.0 percent of a non ionic spray adjuvant (blend of methylated seed oil and emulsifiers) to water. Addition of a quality adjuvant is recommended because it is expected to enhance performance through wetting and penetration of the foliage. Refer to Table 1 for mixing instructions.

**Table 1. Mixing Instructions for Backpack or Power Sprayers with a Handgun**

<b>Ingredient</b>	<b>Percent</b>	<b>1 gal.</b>	<b>4 gal.</b>	<b>15 gal.</b>	<b>30 gal.</b>
Tordon 22K	1.5	2 oz.	8 oz.	29 oz.	58 oz.
Reclaim	0.5	1 oz.	3 oz.	10 oz.	19 oz.
Adjuvant	0.5	1 oz.	3 oz.	10 oz.	19 oz.

*Ounces of Ingredients to Obtain Recommended Spray Mix by Tank Size\**

For broadcast applications to control dense stand of shrubs or extensive areas with thousands of seedlings per acre, apply 1.5 quarts of Tordon 22K, 0.5 quart of Reclaim, and 0.5 quart of a quality non ionic spray adjuvant per acre. A dye also can be added to the mixture to mark spray lanes to ensure proper coverage of treatment sites. Again, fill the tank half full with water and add the herbicides, adjuvant, and dye, and then fill the tank to capacity with water. We recommend that 15 to 20 gallons of the spray mix be applied per acre.

## Equipment

For selective treatment of individual shrubs, backpack sprayers can be the most efficient equipment to use. A backpack sprayer with a diaphragm pump is recommended. Backpack sprayers with piston pumps are not recommended because they have a tendency to leak. A Swissmex SP1 or Solo Model 475 is dependable and inexpensive backpack sprayers commonly

used by applicators. A Model 30 Gunjet or WCCI 210 Trigger jet with a TP 2503 flat fan spray tip is suggested for treatment of mature shrubs. If most SRB shrubs are relatively small, a TP 1503 spray tip may be preferable. A TP 2505 or TP 4005 spray tip may provide more effective coverage for treatment of seedlings that cover large areas. The ease of coverage of the foliage should be the determining factor for the spray tip to use.

Power sprayers on ATV's or in the back of a truck become more efficient when large areas of shrubs and seedlings must be sprayed. Spray guns or booms with appropriate nozzles can be used. A rather high spray volume must be used to ensure that all parts of the target plants, from the growing tip downward, are wet almost to the point of runoff.

## Conclusion

While many factors must be considered when developing a local SRB control program, it is important to develop a long-term management strategy that is adaptable to meet specific objectives and to use IVM techniques that are effective, economical, and environmentally acceptable. Management plans should include mapping of the infestation, prevention practices to avoid the spread of seed, timely annual control using appropriate methods, annual monitoring of treatment success, and restoration of the site using desirable vegetation. It must be realized that sustained control will be necessary for many years to eradicate a SRB infestation center.

## Acknowledgement

Clare Hydock formerly served as the rangeland management specialist, Verde Ranger District, Prescott National Forest, and participated in the planning, development, and implementation of the SRB program. She is currently serving as the botanist, Bradford Ranger District, Allegheny National Forest, in Bradford, Pennsylvania.

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## Assistance

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Pesticides used improperly can be injurious to human, animals, and plants. Follow the directions and heed all precautions on the labels. Store pesticides in original containers under lock and key — out of the reach of children and animals — and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

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NOTE: Some states have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Environmental Protection Agency, consult your local forest pathologist, county agriculture agent, or State extension specialist to be sure the intended use is still registered.