

Field Guide for Managing Rabbitbrush in the Southwest



Cover Photos

Top left: Green rabbitbrush, USDA Forest Service

Top right: Green rabbitbrush flowers, Mary Ellen Harte, Bugwood.org

Bottom left: Rubber rabbitbrush flowers, USDA Forest Service

Bottom right: Rubber rabbitbrush, USDA Forest Service

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Green Rabbitbrush (*Chrysothamnus viscidiflorus*)

Rubber Rabbitbrush (*Chrysothamnus nauseosus*, syn. *Ericameria nauseosa*)

Sunflower family (Asteraceae)

Green and rubber rabbitbrush are native shrubs that grow widely across western U.S. rangelands. Though they can appear as a weedy monoculture (especially following disturbance), they are early colonizers and their presence can be reduced under improved management regimes.

This field guide serves as the U.S. Forest Service's recommendations for management of green rabbitbrush and rubber rabbitbrush in woodlands, rangelands, and deserts associated with its Southwestern Region. The Southwestern Region covers Arizona and New Mexico, which together have 11 national forests. The Region also administers 4 national grasslands located in northeastern New Mexico, western Oklahoma, and the Texas panhandle.

Description

Green rabbitbrush (synonyms: yellow rabbitbrush, Douglas rabbitbrush, chamisa) and rubber rabbitbrush (synonyms: gray (also grey) rabbitbrush, golden rabbitbrush, chamiso blanco) are native shrubs and while often unwanted are usually not considered to be invasive. The genus *Chrysothamnus* is very complex with as many as 16 species and 41 subspecies described in the literature.

Some species are widespread geographically, and some are restricted to a limited area. The specific rabbitbrush species of concern should always be known before proceeding with management. In this guide, suggestions for management are directed mostly toward green and rubber rabbitbrush, but control methods may be applicable to other species as well.

Growth Characteristics

Both species of rabbitbrush are perennial, warm season, native shrubs with rounded or pyramidal-shaped canopies. Growth characteristics for both species are summarized in table 1. In addition to the growth characteristics shown in the table, both species exhibit the following:

- A deep root system with a taproot and less developed lateral roots.
- Flowers are perfect, meaning both male and female structures are present within each flower.
- Reproduce vegetatively and via seed; seeds are wind-disseminated achenes with a pappus; seed ripens in autumn, but may germinate in either the spring or fall with available soil moisture. Though abundantly

Table 1. Growth characteristics

Species	Vegetative Appearance	Stems	Leaves	Flowers
Green rabbitbrush	Grows 12–48 inches tall with a more compacted crown width.	Smooth, greenish-yellow stems.	Green rabbitbrush leaves are linear similar to rubber rabbitbrush but lack a felt-like layer. Instead, they have a bright green dotted appearance and are arranged in a slight spiral at the stem.	Green rabbitbrush subspecies tend to have smooth, papery, layered involucre and appear sticky at the base of the flower clusters.
Rubber rabbitbrush	Open, wide-spreading crown; grows to 12–90 inches tall and are typically 0.2 to 3-feet wide, but may grow as wide as tall.	Upright, yellowish-green, flexible stems from base with a grayish-white appearance due to the presence of dense, tangled, felt-like white hairs.	Rubber rabbitbrush leaves are linear, less than 0.04-inch wide, and covered by a felt-like layer that serves to insulate and reduce evapotranspiration.	Though appearance varies between subspecies of rubber rabbitbrush, flowers tend to be yellow in color, tubular shaped, and occur in clusters at the tips of upright stems. The grayish subspecies tend to have tangle-haired bracts (involucre) below the flower.

produced, seeds do not persist in the seed bank; typically, seed is viable for less than 3 years.

Germination occurs over a broad range of temperatures, requires at least 13 percent soil moisture, and may be inhibited by high soil salinity. Vegetative sprouts emerge from buds located on lower stems and the root crown at or slightly below the soil surface.

Ecology

Impacts/Threats

Green and rubber rabbitbrush are well suited for restoration and are commonly planted on damaged sites, especially strip mines, road cuts, and severely deteriorated rangeland. When intentionally planted, these shrubs establish easily and grow rapidly into uniform stands. On undisturbed rangelands, green and rubber rabbitbrush will increase in cover and density after fire or heavy disturbance. With time and improved management, they usually become less prominent as sagebrush and other associated species return.

Site/Distribution

These shrubs favor sunny, dry, open sites and tend to grow on medium to coarse-textured soils such as sandy, gravelly, or loam soils. Rubber rabbitbrush tolerates a wide range of pH values, from moderately acidic to strongly alkaline. It is often one of the first plants to colonize an area following extreme disturbance and can even establish and grow in harsh soil conditions such as mine spoils. Green rabbitbrush is somewhat tolerant of saline soil and is used as an indicator species for degraded sites. Both rabbitbrush species span a wide range of elevations from sea level to 10,500 feet elevation.

Spread

Rabbitbrush propagates vegetatively and by seed; all species of rabbitbrush are very prolific seed producers. Seed is easily dispersed via wind, water, humans, birds, and rodents. Seed is also spread over long distances by adhering to surfaces and undercarriages of road vehicles and road maintenance equipment.

Invasive Features

Although not invasive, rabbitbrush species can increase substantially, particularly in disturbed areas such as abandoned crop fields, overgrazed areas, or rangeland that

has been replanted. While rabbitbrush rapidly expands following disturbance, it is not overly competitive and may actually (1) build soil stability and structure, (2) prevent other detrimental species from establishing, and (3) create a favorable microclimate for establishing desirable plants.

Management

Due to copious seed production and a tendency to reproduce vegetatively following surface disturbance, rabbitbrush populations can quickly become a dense monoculture. Early detection, control, and follow-up monitoring of rabbitbrush coupled with improvement in range condition are important for long-term rabbitbrush management. The following actions should be considered when planning an overall management approach:

- Healthy plant communities should be encouraged and maintained to limit rabbitbrush infestations.
- Detect, map, and eradicate new populations of rabbitbrush as early as possible. Keep annual records of reported infestations.
- Combine mechanical, cultural, and chemical methods for most effective control.
- Implement monitoring and a follow-up treatment plan for missed plants and seedlings.

Table 2 summarizes management options for controlling rabbitbrush under various situations. Further details on these management options are given below. Choice of method(s) for rabbitbrush control depends on numerous factors including current land use and site condition, accessibility, terrain, microclimate, extent and density of infestations, and nontarget flora and fauna present. Other considerations include treatment effectiveness, cost, and number of years needed to achieve control. More than one control method may be needed for each site.

Physical Control

Rabbitbrush top growth is easily removed by cutting, grinding, or mowing; however, plants will quickly sprout new shoots and stems following treatment. The root system is very difficult to extract, and cultivation methods used alone may actually increase rabbitbrush density.

Table 2. Management options*

Site	Physical Control	Cultural Control	Biological Control	Chemical Control
Roadsides, fence lines, or non-crop areas	Mowing alone will suppress top growth but will not control the plants. Consider mowing in combination with herbicide control.	Clean machinery following activity in infested areas. Train road crews to identify and report infestations.	Leaf beetle (<i>Trirhabda nitidicollis</i>) has shown potential for control; however, USDA has not given approval for it as a biocontrol agent.	For ground application, use ATV, truck mounted, or tractor pulled spraying equipment. Wash under vehicle after application to prevent spread.
Rangelands, pastures, or riparian corridors	Physical methods (including prescribed burning) are usually unsuccessful and tend to increase density.	Avoid driving directly through infestation; limit disturbance. Reseed with plants that are desirable and will compete.	Same as above.	For widespread infestations, use ground or aerial broadcast spraying. For sparse infestations, use backpack spraying.
Wilderness, other natural areas, and/or small infestations	Remove localized populations by hand. Manage to improve overall range health.	After passing through infested area, inspect and remove any seed from animals, clothing, and vehicles.	Same as above.	Use backpack or hand-held sprayers to spot treat plants.

* Choice of a particular management option must be in compliance with existing regulations for the land resource.

Manual Methods

Rabbitbrush roots must be completely removed to control the plant. Hand removal of young plants by digging, pulling, etc., can be done; however, extracting older shrubs is extremely difficult and is not generally recommended.

Mechanical Methods

If using machinery to manage rabbitbrush, the equipment should be cleaned after use to prevent movement of seed into un-infested areas.

Mowing – Mowing used alone as a control method will only suppress top growth. Returning shoot growth may make later control efforts more difficult. Use of a mowing system that simultaneously cuts through unwanted vegetation and applies herbicide onto cut stubble at the same time (e.g., the WetBlade System rotary mower produced by Diamond Mowers™ Inc.) may be considered. However, reported results using this type of equipment on rabbitbrush have been inconsistent. It is recommended that this type of mower system be tested on a small localized area and results evaluated before proceeding to larger areas.

Tillage – Not recommended except in agronomic situations.

Prescribed Fire

Rabbitbrush usually increases in foliage growth and density following fire. Therefore, prescribed burning is not recommended as a stand-alone control treatment.

Cultural Control

Prevention, early detection, and managing overall range health are critical for reducing rabbitbrush density over time. Land managers, the local public, and road crews should be educated on identifying rabbitbrush so they can help report all newly established infestations. Vehicles, humans, and livestock should be discouraged from traveling through infested areas. If possible, weed screens should be used on irrigation water intakes in infested areas to prevent seed transportation in irrigation canals.

Biological Control

Grazing

Although occasionally browsed by livestock and wildlife, rabbitbrush is not highly preferred; and its value varies widely by subspecies and season. Generally, grayish or white subspecies have a higher palatability rating than greenish subspecies. Though considered slightly toxic and of limited value to all livestock, certain rabbitbrush subspecies may receive some light use by mule deer,

Table 3. Unapproved potential biocontrol agents for green and rubber rabbitbrush

Species	Type of Agent	Site of Attack/Impact	Use/Considerations for Release
<i>Trirhabda nitidicollis</i>	leaf beetle	Both the adult and larvae feed on rabbitbrush leaves, though use by larvae is heavier and more likely to result in mortality.	Moderately effective control is possible; however, USDA approval status for formal use as a biocontrol agent is uncertain.
<i>Aciurina bigeloviae</i>	gall-forming fly	Cottony galls form on stem and green flower-like growths occur on twigs or small branches.	USDA approval status for formal use as a biocontrol agent is uncertain.

pronghorn, jack rabbits, and other wildlife (especially during winter months). Due to low utilization and limited season of use, grazing by livestock is unlikely to be an effective management tool. Furthermore, intense grazing should be discouraged to prevent rabbitbrush expansion.

Classical Biological Control

No USDA-approved biocontrol agents are available. A rabbitbrush leaf beetle and a gall-forming fly have both been observed as being detrimental to rabbitbrush growth (table 3). While these insects may be useful as biocontrol agents, formal approval for release has yet to happen.

Chemical Control

While either rabbitbrush species is not easily controlled by herbicide spraying, green rabbitbrush tends to be more difficult to kill than rubber rabbitbrush. All herbicides listed in table 4 will control or suppress rabbitbrush when properly applied. Each herbicide product shown in the table has different requirements and restrictions according to the label. Check label mixing instructions when preparing an oil-water emulsion. Read and understand the label prior to any application. Consult the registrant if you have questions or need further detail.

Herbicide Application

For effective control, growing conditions and spray timing must be ideal at the time of treatment. If not, herbicide spraying will likely suppress rabbitbrush but not provide a high degree of plant kill. Before spraying, always check targeted rabbitbrush plants for healthy foliage that is the result of favorable growing conditions and soil moisture. Preferably, soil should be moist in the top 4 inches. Plants that are drought-stressed should never be sprayed.

Treatment timing with herbicides is critical for successful control of rabbitbrush. When considering a spring

application (typically late April–May), it is best to spray in a year when the previous winter precipitation has been above normal and rabbitbrush has produced abundant leaders and leaves (2.5–4 inches of new growth).

Clopyralid or picloram applied in combination with 2,4-D are the herbicides recommended for spring treatment. Fall applications should be made in years with above normal summer rainfall and when rabbitbrush has reached the late to post-flower stage (typically late September–October). Picloram or a herbicide combination of picloram + fluroxypyr are recommended for fall treatments. Hexazinone is a nonselective soil sterilant and can be applied any time of the year. However, hexazinone treatments can severely damage nearby desirable plants; the herbicide is best used as a spot treatment applied directly to individual rabbitbrush plants before anticipated rainfall in late fall.

Herbicides may be applied with backpack or hand-held sprayers, ATV or UTV sprayers, or conventional boom sprayers that are pulled or attached to a tractor or truck. Any equipment used to spray herbicide should be calibrated. For rubber rabbitbrush, the effectiveness of foliar-applied herbicides can be improved by using a high spray volume (~ 20 GPA) that helps saturate the felt-like leaf and stem layer. For sparse populations of either rabbitbrush species, one person or a small team can treat the rabbitbrush by using an individual plant treatment (IPT) approach. Isolated plants may be spot sprayed by wetting the foliage and stems without dripping through the use of an adjustable spray nozzle attached to a hand-held or backpack sprayer. An alternative is to apply a soil treatment for each target plant at the canopy drip line or at the base of the rabbitbrush. A broadcast approach to spraying may be used to address medium to large infestations.

Table 4. Herbicide recommendations

Common Chemical Name (active ingredient)	Product Example ¹	Broadcast Treatment (rate per acre)	Spot Treatment (spray solution or pellets) ²	Time of Application	Remarks
Aminocyclopyrachlor + metsulfuron methyl + triclopyr	Streamline + Garlon 3A	4.75 to 8 oz + 1.0 to 1.5 lb	Add 5 to 9 grams of dry flowable powder to 1 gal water	Most effective in late summer-early fall before frost.	<p>Persistent; selective for broad-leaved plants and certain brush species; may cause temporary injury to some grass species.</p> <p>A selective blend of active ingredients labeled for use in non-crop areas such as uncultivated, non-agricultural areas (highways, utility rights-of-way, etc.); uncultivated, non-crop producing, agricultural areas (farmyards, fence rows, etc.); and natural areas (wildlife management areas, wildlife openings, wildlife habitats). Can be used in riparian areas. May also be used on public, private, and tribal lands as part of an early detection and rapid response (EDRR) in treating infestations of invasive weed species.</p>
Clopyralid + 2,4-D ³	Curtail	2.2 kg/ha	1-3%	During active growth with 2.5–4 inches of new growth, but when grasses are going dormant	<p>Selective, post-emergent broadleaf herbicide. Not recommended for areas with rapid soil permeability such as sandy loams to sandy soils.</p> <p>Use medium to coarse droplet spray setting; do not apply when wind speeds exceed 15 mph.</p>
Picloram ⁴	Tordon 22k	1 to 2 qt	1.5-3%	Late post-flower stage with favorable soil moisture	Selective; affects many broadleaf species but will not harm most grasses.
Picloram ⁴ + fluroxypyr	Surmount	3 to 6 pts	1%	Same as above	<p>Best for late season control.</p> <p>Rabbitbrush control is not listed on the specimen label. Check with the manufacturer concerning specific localized recommended rates.</p>
Picloram ⁴ + 2,4-D ³	Grazon P+D	2 qt (as an alternative, mix Tordon at 2-3 pints per acre plus 1-2 pints of 2,4-D ester with a high quality oil based adjuvant)	1.5-3%	During active growth with 2.5–4 inches of new growth in spring	<p>Selective; affects many broadleaf species but will not harm most grasses.</p> <p>Best for early season control.</p>

Table 4. Herbicide recommendations (cont.)

Common Chemical Name (active ingredient)	Product Example ¹	Broadcast Treatment (rate per acre)	Spot Treatment (spray solution or pellets) ²	Time of Application	Remarks
Hexazinone	Velpar	n/a	4-6 mL per 3 ft of canopy diameter	Any time of year; best just before rain. Do not use on frozen soil.	Not recommended for soils with high clay content. Use individual plant treatment (IPT). Apply undiluted within 3 feet of base of stems.
Hexazinone	Pronone Power Pellet	n/a	1 pellet per 2 ft. plant diameter	Same as above.	Use IPT. Scatter pellets around drip line of canopy.

¹ Trade names for products are provided for example purposes only, and other products with the same active ingredient(s) may be available. Individual product labels should be examined for specific information and appropriate use with rabbitbrush.

² Spray solution is the herbicide/water ratio in a spray mix that may be used for spot treatment with backpack or hand-held sprayers. The amount of product applied during an annual growing season must not exceed the maximum application rate per acre as specified by the product label – refer to the product label for the site type and application.

³ 2,4-D is a restricted use pesticide in New Mexico only. A certified applicator’s license is required for purchase and use.

⁴ Restricted use pesticide - A certified applicator’s license is required for purchase and use.

Management Strategies

Consider treating smaller, less dense populations of rabbitbrush or isolated plants on areas with a healthy perennial grass understory first. Next, satellite populations and plants at the perimeter of heavily infested areas should be treated. The larger, denser cores of the infested area should be addressed in the final phases of treatment.

Because each treatment situation is unique, any strategy adopted for managing rabbitbrush must involve careful planning. A clear picture of goals and objectives for specific treatment sites and a plan for improving overall management is a must for rabbitbrush control. Vigorous competition from perennial plants, especially grasses, should always be promoted. Rabbitbrush prefers germinating in open areas, and propagation is poor when there is a vigorous grass component. Reseeding with desirable plant species should always be considered where feasible; however, reseeded may not be necessary if understory vegetation is present on the treatment site. The decision to reseed should always be made well in advance of any rabbitbrush control effort. This is because the reseeded choice directly affects how best to proceed with control efforts. If a localized population needs to be removed to meet a particular land use goal, it is highly

recommended that areas with rabbitbrush should be treated and reseeded simultaneously in the fall (i.e., single entry approach) to prevent other weedy species from establishing.

Control efforts for rabbitbrush will likely require several years of persistent, repeated treatment. Since it is ordinarily useless to treat an area only one time without retreatment, sufficient resources must be allocated for the area where control is attempted. After initial treatment, it is especially important that resources are also available to respray or retreat the treated area as necessary. Treated areas should be monitored periodically and have follow-up treatment, especially to allow the return of desirable native plant species and to remove unwanted invasive plants.

References and Further Information

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Suggested Web Sites

For information about calibrating spray equipment:

NMSU Cooperative Extension Service Guide A-613, *Sprayer Calibration*. Available at http://aces.nmsu.edu/pubs/_a/A613

Herbicide labels online: Available at <http://www.cdms.net/>

**For more information or
other field guides, contact:**

USDA Forest Service
Southwestern Region
Forest Health
333 Broadway Blvd., SE
Albuquerque, NM 87102

**Or visit the Southwestern Region's
website for invasive species:**

<http://www.fs.usda.gov/goto/r3/invasivespecies>



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