United States Department of Agriculture

Forest Service

Southwestern Region

Low-Impact, Selective Herbicide Application for Control of African Rue

A Preliminary Field Guide by Doug Parker and M. Hildegard Reiser

Printed on recycled paper – June 1997

Low-Impact, Selective Herbicide Application for Control of African Rue

Background

African rue, *Peganum harmala* L., is a perennial desert shrub that belongs to the calthrop family (*Zygophyllaceae*). The plant is bright green, succulent, and grows to about a foot in height. Plants appear to be small bushes with many branching stems and narrow leaves. Flowers are white with five petals, and fruits grow as leathery capsules with 45-60 seeds.

African rue is a native plant from northern Africa, through the Middle East, to Tibet in Asia. Prolonged overgrazing, periodic dryland farming, and removal of competing desert plants have allowed it to increase over its native range. The plant contains toxic alkaloids that are lethal to cattle and sheep, but poisoning is rare because the plant is extremely unpalatable. Young leaves and mature seeds are more toxic than other parts of the plant. When crushed leaves and stems have a disagreeable odor.

African rue was introduced into the United States near Deming, New Mexico, in 1928 by a farmer who wanted to raise it to produce a dye, turkey red, used for dyeing wool yarn. This exotic plant has no insect or disease enemies in New Mexico to suppress its growth and spread. Infestations have spread over a wide area in the southern part of the State and are moving northward. African rue prefers disturbed sites such as on highway and road right-of-ways and desert rangelands. It is regarded as a significant weed problem in Otero County and on Holloman Air Force Base near Alamogordo, New Mexico. It also has been found in western Texas, Arizona, California, Nevada, Idaho, Oregon, and Washington.

African rue is spread by seeds, but it will sprout from roots or root fragments. Its branching roots can grow as deep as 20 feet. It will grow on a variety of soils and tolerates alkaline and alkaline soils. This plant is extremely drought tolerant, and it has expanded into desert rangelands and replaced desirable native plants like saltbush and grasses. It has a competitive advantage over native plants because it begins growth earlier in the spring. A second advantage is that major seeding establishment probably occurs during periods of drought when native plants are suppressed. In addition, most parts of the plant contain allelopathic chemicals that retard or prevent the growth of other vegetation.

Management Options

Successful land owners and resource managers choose vegetation management methods that are effective, economical, and environmentally sound. As with most exotic plants, the first line of defense should be prevention to slow the spread of the plant. African rue seeds can be spread by hay, seed mixture, equipment, livestock, and vehicles. To date, little or no effort has been made to institute laws or regulations to prevent the spread of this plant in New Mexico. However, Otero County implemented a voluntary noxious plant control program in 1996, and African rue was placed on the County’s primary noxious weed list.

Mowing and blading of plants along road sides and around facilities on military bases has had little effect in reducing infestation and probably has resulted in increased spread of African rue. Roots are too deep for hand pulling to be successful where the removal of all roots, sprouts and seeding has been continued over a period of years, but this type of treatment is extremely expensive. Repeated cultivation to a depth of 8 to 10 inches followed by seeding perennial grass

has been shown to be successful in reducing African rue in its native range in Asia. Again, these repeated mechanical treatments are costly and are not generally considered to be a viable option in New Mexico. Disturbance of soil favors the spread of African rue and should be avoided as much as possible. It is important to select management options that favor the development of desirable vegetation that can compare with African rue.

Since no information could be found on the successful use of herbicides to control African rue, trial plots were established on Holloman Air Force Base to determine if an effective technique could be developed. Several different application techniques and herbicides were evaluated, but the only effective results were achieved with a foliar application of a water/oil emulsion of Garlon 4 or Remedy (triclopyr, Trademark of DowElanco) and a mixture of Garlon 4 and Stalker (Imazapyr, Trademark of American Cyanamid). Garlon 4 is registered for use on rights-of-way, industrial sites, non-crop areas, etc., and a mixture with Stalker could be used on the same sites. Remedy is registered for use on rangeland and permanent pastures. An advantage of triclopyr is that it is a selective herbicide that will have little or no effect on desirable grasses. Imazapyr has a more broad spectrum effect on plants, including grasses. With proper herbicide applications, the effectiveness of control will be about 80 percent or higher. Thus, it must be realized that African rue infestations cannot be controlled with one application. Multiple applications will be needed, possibly for 2 to 3 years, to reduce infestations to a low enough level to allow desirable vegetation to occupy a treatment area. In some cases, occasional spot treatments may be necessary to remove invading African rue plants from nearby untreated areas.

The purpose to this preliminary field guide is to describe the new foliar spray method for African rue. As experience is gained, control recommendations with the herbicides could be modified.

Foliar Spray Method

Treatment Timing

Then recommended treatment window for African rue is relatively narrow. Applications need to be done in the fall over about a 6-weel period from late September through October before the first killing frost occurs. After a heavy frost occurs, treatment will not be as effective in causing root kill. Applications done in the spring and summer will cause some top kill of treated plants, but it appears that treatment at this time of year will not provide effective root control.

Equipment

For relatively small acreages, such as along fences or around buildings or other structures, backpack sprayers can be the most efficient equipment to use. A backpack sprayer with a diaphram pump is recommended. Backpack sprayers with piston pumps have a tendency to leak and are not recommended. A Swissmex SP1 or Solo Model 475 are commonly used units that are relatively inexpensive. A WCCI 210 Trigger Jet spray gun or Model 30 Gunjet with a TP 2503, TP 2505, or TP 4006 flat fan spray tip is suggested. The ease of coverage of the foliage should determine the spray tip to use. Power sprayers on ATV's or in the back of pickups become more efficient when larger areas are planned for treatment. Spray guns or booms with flat fan nozzles can be used, depending on the site to be treated. Most commercial applicators use flat fan spray tips like TP 401 OE or TP 8015E. Treatment of extensive African rue infestations along highways or roads should be done with a truck and large capacity spray tank with spray booms. Experienced commercial applicators or State Highway Department personnel will usually conduct such large-scale treatments. With any application equipment, a rather high spray volume

must be used to ensure that all parts of the plants, from the growing tip downward, are wet almost to the point of runoff.

Mixing

For treatment of small areas with a backpack or power unit with a spray gun, add Triclopyr (Garlon 4 or Remedy, depending on site) at a concentration of three percent in water. Also, add three percent oil and 0.5-1.0 percent of an emulsifying agent, like Cide-Kick, to the herbicide and water mixture. On public lands, the use of a vegetable oil, such as Improved JLB Oil Plus, is recommended. Cide-Kick and Improved JLB Oil Plus can be obtained from Brewer International. Mixing instructions are shown in Table 1.

Table 1. Mixing Instructions for Treatment of Small Areas (Ounces of Ingredients to Obtain the Recommended Spray Mix Tank Size)

Ingridient	Percent	1 gal.	4 gal.	15 gal.	30 gal.	55 gal.	125 gal.
Triclopyr	3	4 oz.	15 oz.	58 oz.	115 oz.	211 oz.	480 oz.
Oil	3	4 oz.	15 oz.	58 oz.	115 oz.	211 oz.	480 oz.
Emulsifier	0.5-1.0	1 oz.	3 oz.	10 oz.	19 oz.	35 oz.	80 oz.

*Water is added to the herbicide and additives to the tank capacity

A mixture of Garlon 4 and Stalker can be applied in a similar manner. The results for this combination of herbicides are preliminary, but it appears that acceptable results may be achieved. This combination of herbicides can be considered on sites, such as on the sides of aircraft runways, where removal of grasses and other desirable vegetation would be considered beneficial. The recommended concentration of the herbicides is 2 percent for Garlon 4 and 0.5 percent Stalker. Three percent oil and 0.5-1.0 percent emulsifier is needed. Mixing instructions are shown in Table 2.

Table 2. Mixing Instructions for Garlon 4 and Stalker

Ingredient	Percent	Tank Size.					
		1 gal.	4 gal.	15 gal.	30 gal.	55 gal.	125 gal.
Garlon 4	2	2.6 oz.	10 oz.	38 oz.	77 oz.	141 oz.	320 oz.
Stalker	0.5	0.6 oz.	2.6 oz.	9.6 oz.	19 oz.	35 oz.	80 oz.
Oil	3	4 oz.	15 oz.	58 oz.	11 5 oz.	211 oz.	480 oz.
Emulsifier	0.5-1.0	1 oz.	3 oz.	10 oz.	19 oz.	35 oz.	80 oz.

**Water is added to the herbicides and additives to the tank capacity.*

For large-scale operations along roads and highways, the same percent mixture of herbicides and other ingredients are recommended. The volume of spray to be applied will be about 20-25 gallons per acre depending on the size and density of African rue plants.

Spraying

With backpacks or power sprayers, wet the foliage from the top down being sure to spray all the growing tips. The foliage should be sprayed until the leaves glisten, but not to the point of dripping. For broadcast application with spray booms, wetting of the foliage needs to done in a similar manner.

Acknowledgment

The development of these new herbicide control techniques would not have occurred without the technical assistance of Max Williamson, Private Consultant. We also would like to thank Mike Tachett, 846 Test Group, Holloman Air Force Base, for providing sites for evaluating the various herbicide control options.

Assistance

If you have questions or need assistance, contact Doug Parker at 505842-3280 or USDA Forest Service, 517 Gold Avenue SW, Albuquerque, NM 87102; or Hildy Reiser* at 505-4753931 or 49 CES/CEV, 556 Tabosa Avenue, Holloman Air Force Base, Alamogordo, NM, 88330-8458.

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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is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

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.