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# Puncturevine: Identification and Management in Idaho

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## Key Points

- An [Idaho noxious weed](#)
- An invasive and rapidly spreading summer annual
- Prostrate plant with trailing stems, yellow flowers, and sharp, pointed burs
- Burs injure animals, humans, and damage equipment and tires
- Multiple management options are available

## Introduction

PUNCTUREVINE (*TRIBULUS TERRESTRIS* L.) IS AN AGGRESSIVE, invasive plant native to the Mediterranean region. Introduced accidentally into North America circa 1900 as a contaminant via livestock (Winston et al. 2014), it is listed on the [Idaho Noxious Weed list](#) and is found in most Idaho counties.

Puncturevine spreads rapidly via its sharp, burred seedpods, which adhere to footwear, clothing, tires, equipment, and animals. Burs are hazardous to animals and humans, and damage equipment and vehicles. The plant aggressively outcompetes beneficial vegetation, including crops and native plants, for water and nutrients. Uncontrolled, it rapidly invades disturbed areas by establishing dense mats of foliage that build a persistent seed bank.

Its economic impact is significant, in that puncturevine reduces quality and yields in row crops, grains, alfalfa, and seed. It is toxic to livestock, particularly sheep, because its foliage contains saponins (DiTomaso et al. 2013), which are bitter-tasting, plant-derived chemicals that cause light sensitivity (Whaley et al. 2007), skin lesions, and inflammation of the ears and lips. Severe cases may be fatal. Puncturevine also accumulates nitrates and contributes to nitrate poisoning in sheep and cattle. Burs injure mouths, digestive tracts, and feet, damage hides, and reduce wool quality (Whaley et al. 2007). Avoid grazing livestock in infested areas, particularly if high quality forages are not available.



Figure 1. Puncturevine.

## Identification

Puncturevine is an annual broadleaf plant from the Zygophyllaceae (caltrop) family. It grows from a deep, slender taproot and forms low-growing, dense mats from trailing, nonrooting, hair-covered stems that are green to reddish brown. Stems may reach up to three feet or longer and radiate outward from the plant's center at the taproot. Cotyledons (the first seed leaves) are thick, oblong, and creased along the midvein. They are green on the upper surface and gray underneath. Leaves are hairy, arranged oppositely, pinnately compound, and divided into four or more oval leaflet pairs ( $\frac{1}{4}$ – $\frac{1}{2}$  inch long). Small, five-petaled, yellow flowers ( $\frac{1}{2}$ -inch wide or less) emerge three to four weeks after germination. Within one to two weeks of pollination, they develop into spined burs that mature from green to brown. Each bur consists of five sections, each with two sharp spines arranged so that one always points upward. Each spine contains one to four seeds, which remain viable for seven years or more. A single plant may produce over 5,000 seeds. The genus name, *Tribulus*, translates to "caltrop," referring to the bur's resemblance to an ancient metal warfare device.

## Characteristics

Germination and seedling emergence require adequate soil moisture and warm temperatures and begins in late spring to early summer, continuing through the growing season. In Idaho, seedlings emerge from late May to early June, with flowering and seed production occurring from mid-June until the fall frost. Seeds germinate at soil depths of up to one inch, during the time when soil temperatures stay above 50°F for two weeks. Exceptionally drought tolerant once established, it prospers in hot, dry conditions, where many plant species cannot grow. Indeed, it cannot tolerate freezing temperatures and struggles in shaded areas.

Puncturevine thrives in disturbed areas such as pastures, orchards, turf, cultivated fields, waste areas, ditch banks, sidewalks, gravel, corrals, vacant lots, railways, and roadsides. It tolerates a variety of soils but prefers dry, loose, sandy, or gravelly conditions.

The weed resembles common purslane, red-stem filaree, and knotweed, but can be identified by its unique leaf, stem, and flower characteristics, particularly by its spined burs, which these other species do not produce.



Figure 2. Puncturevine seedling. Courtesy of Phil Westra, Colorado State University, Bugwood.org.



**Figure 3.** Puncturevine with slender taproot.



**Figure 4.** Puncturevine flower.

## Management Options

Effective control requires a combination of preventive and timely mechanical, cultural, biological, and chemical strategies. Prevention, early intervention, and persistence are key to its successful management.

### Prevention

- Identify puncturevine at all growth stages and eradicate early infestations.
- Monitor high-risk areas, such as ditch banks, roadsides, graveled areas, field margins, and adjacent areas.
- Minimize bare ground, using mulch, weed fabric, or competitive vegetation.
- Prevent spread by removing burs and other plant material from shoes, clothing, tires, equipment, and animals. Seal in heavy bags and discard in a trash receptacle.
- Use certified, weed-free seed, hay, and rootstock. Verify that topsoil, gravel, compost, and other landscaping materials are clean.
- Remove identified plants before flowering to prevent seed production.

### Mechanical Control

- Mechanical removal is most effective before flowering. Multiyear effort is required to deplete the seed bank.
- Hand pull new, small infestations from moist soil.
- Hoe or cultivate small infestations one to two inches deep every two to three weeks as seedlings continue to emerge. Small applications of water induce germination.
- Avoid deep tilling, which may bury seeds and prolong germination.
- Dig taproots of larger plants at least two inches below the plant crown and gather and discard all plant parts.
- Collect remaining burs with rakes, carpet swatches, towels, rollers, sticky materials, or cardboard.
- Apply at least a three-inch mulch layer to suppress growth.
- Avoid mowing because the plant grows too low to be cut effectively.



**Figure 5.** Puncturevine flower and ripening seed. Courtesy of Phil Westra, Colorado State University, Bugwood.org.

## Cultural Control

- Aerate compacted soils to promote healthy vegetative growth.
- Establish healthy, competitive grass and forbs suited to your soil and climate.
- Fertilize lawns and pastures to increase competitiveness; short, sparse lawns and pastures allow for weed establishment.
- Rotate crops when possible, to disrupt weed life cycles.
- Prevent overgrazing to encourage healthy plant competition.

## Biological Control

**Biological control** is the introduction of a natural predator to control a specific pest. The stem miner weevil (*Microlarinus lypriformis*) and the seed weevil (*Microlarinus lareynii*) were introduced from Italy as predators of puncturevine and are approved for use



**Figure 6.** Mature puncturevine bur. D. Walters and C. Southwick, Table Grape Weed Disseminule ID, United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service-Plant Protection and Quarantine, Bugwood.org.

in Idaho. However, both fail to establish due to an inability to overwinter in cold climates (Joseph Milan, personal communication).

## Chemical Control

Herbicides are effective in Idaho lawns and agricultural settings. Some are general use that do not require a pesticide applicator license to purchase and apply, while others are restricted use that require a pesticide applicator license.

- Spot treat with general-use, selective herbicides targeting broadleaf weeds in residential areas.



**Figure 7.** Different stages of puncturevine bur maturity.

Product	Active Ingredient(s)	Application Timing	Target Sites	Cautions
<b>2,4-D</b>	2,4-D	Postemergent; If label allows, every 3 weeks during growing season	Roadsides, rangeland, noncropland	May damage sensitive crops. Do not allow spray to drift.
<b>Perspective</b>	Aminocyclopyrachlor + Chlorsulfuron	Spring; postemergent	Rangeland, industrial sites	May injure desirable grasses and nearby shrubs and trees. Do not allow spray to drift.
<b>Krovar I DF</b>	Bromacil + Diuron	Preemergent	Noncropland, right-of-ways	Nonselective; do not spray near roots of desirable plants; it requires rain for activation.
<b>Telar</b>	Chlorsulfuron	Late fall or late winter; preemergent to growth.	Rangeland, pasture, noncropland	Drift may injure crops; requires soil moisture to activate.
<b>Plateau</b>	Imazapic	Early postemergent	Rangeland, pasture, roadsides	Crop rotation restrictions apply.
<b>Rejuvra</b>	Indaziflam	Preemergent (apply weeks before germination)	Grazed and nongrazed rangeland	Not for use near sensitive crops or turfgrass.
<b>Roundup</b>	Glyphosate	Postemergent when vines are small	Roadsides, bare-ground areas	Will kill all vegetation.

**Table 1.** Herbicide options for puncturevine control.

- Preemergent herbicides prevent weed seeds from germinating and are useful for controlling annual weeds on bare ground.
- Postemergent, selective herbicides target actively growing puncturevine and other broadleaf plants in lawns and pastures.
- Postemergent, nonselective herbicides kill all actively growing vegetation and are useful where bare ground is desired.

### Application Considerations:

- Apply at the seedling stage for the best results.
- Avoid herbicide use during hot, dry weather ( $\geq 85^{\circ}\text{F}$ ), which may cause volatilization and drift and reduce treatment effectiveness. Read and follow the label of your selected product for any temperature restrictions.
- Do not spray when the wind exceeds ten miles per hour, per Idaho State Department of Agriculture regulations. Read and follow the label of your selected product for additional wind restrictions.
- Rotate among herbicide families to minimize herbicide-resistant weed development.

- Be aware of and use caution near sensitive areas and water sources.
- Always read and follow the label for species-controlled rates and timing, required personal protective equipment, and site-specific guidance.
- Consult Table 1 for herbicide options. Complete herbicide recommendations and application details for puncturevine can be found at <https://pnwhandbooks.org/weed/problem-weeds/puncturevine-tribulus-terrestris>.

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## Further Reading

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