



Identification and Management of Puncturevine (*Tribulus terrestris* L.)

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Puncturevine (*Tribulus terrestris* L., family Zygophyllaceae) is an annual noxious weed familiar to outdoor enthusiasts who have had unfortunate close encounters with this plant's thorny seeds. A native of Europe and Asia, puncturevine may have been introduced to the United States as a contaminant in the wool of sheep imported from the Mediterranean region. Also called goathead, bullhead, or Mexican sandbur, this weed grows rapidly along roads and waste places, leaving an ample seed bank to

ensure its spread. This weed is named on Nevada's noxious weed list.

Why should we be concerned?

The large, spiny seeds of the puncturevine plant can cause injury to the mouths and digestive tracts of livestock, and diminish the value of hay and wool. The weed contains a photosensitizing agent that poisons sheep when they eat flowering plants. Recreationists find the weed to be a nuisance, causing punctured bicycle tires



Puncturevine is a flat-growing, mat-forming, rapidly spreading weed.



Thorny seeds easily attach to car and bicycle tires, helping spread the weed along roadsides. The seeds are capable of puncturing bicycle tires.

and injuries to feet. Because it grows rapidly and produces seed quickly, infestations may increase greatly in size unless controlled or soil moisture becomes limited. The large mat-like infestations crowd out desirable plants.

What does puncturevine look like?

Puncturevine has a distinctive, low-growing, trailing, mat-like form. Its prostrate, green to reddish. hairy stems grow to 5 feet long and are highly branched, radiating from the crown of the plant. When shaded or competing with other plants, the stems may grow more erect and eventually trail over low-growing species, shading them out.

The plant is characterized by hairy leaves that are 1 inch to 2 inches long. Leaves are pinnately compound with three to seven leaflet pairs per leaf. Leaflets are tiny and oblong. Puncturevine has a somewhat woody taproot that can grow to 8.5 feet deep.

Bright yellow flowers are produced from late spring through early fall. The flowers have five petals and four sepals, and are pollinated by insects. A characteristic gray to yellowish-tan,

woody, 0.5-inch diameter burr then forms. It consists of five wedge-shaped nutlets, each of which has two stout spines. Three to five seeds are formed within each nutlet, and remain enclosed within the burrs. These burrs will often remain on the plant after it has been killed by frost, or are found on the soil surface after they break off or the plant dies and deteriorates.

Where does it grow?

Puncturevine is often found in croplands and



The leaves are composed of three to seven leaflet pairs, and the flowers are tiny and yellow, and have five petals.



Puncturevine burrs consist of five wedge-shaped nutlets containing three to five seeds each.

pastures, along roads, and in urban areas including alleys and vacant lots. It will grow in many types of soils, including compacted soil, sandy to clayey soils, dry or moist soils, and poor or rich soils. It grows best in areas where competition from other plants is limited. While it is widespread in the United States, the worst infestations are in the southwestern United States. The weed is common throughout Nevada.

How does it spread?

A summer annual, puncturevine reproduces by seed. The spiny nutlets adhere to tires, shoes, and clothing of people, as well as the fur, feathers and feet of animals, aiding its spread. The seeds appear to require a ripening period of about six months to one year, with germination occurring during spring and summer of the year after they were produced.

Germination requires warm temperatures and moisture. Seeds may germinate after any wet period during late spring and summer. Seeds may remain dormant during dry periods and are viable for four to five years. Plants grow rapidly, and flowers may be produced on new seedlings within three weeks, resulting in seed production as early as six weeks after germination. A plant may produce 200 to 5,000 seeds during one growing season, and a large plant may produce 10,000 or more seeds.

How is puncturevine controlled?

Long-term control of puncturevine relies upon the persistent elimination of seed stored in the soil. As with all annuals, mechanical controls are effective, although puncturevine's low-growing form makes mowing ineffective. On small infestations, hand-pulling is feasible, especially when soils are moist and the vines are sufficiently long to allow pulling. Hoeing and shallow cultivation are also effective at killing



Puncturevine infests a roadside in Yerington, August 2001.

existing plants, and should be initiated prior to flowering and seed production. Shallow tilling of one inch or less is sufficient, particularly when plants are small. Be aware, however, that tilling may bury seed that remains viable in the soil for several years.

In areas where many seeds have been deposited due to lack of control in previous years, it may be useful to attempt to harvest seeds by placing carpet or other “sticky” material on boards or a roller that are then applied to or rolled over the soil. With several passes, most of the seed on the soil can be removed. The seeds must be carefully contained, removed, and disposed of to prevent their spread. Application of 4 inches to 6 inches of organic mulch or synthetic light-excluding fabrics are also successful in controlling puncturevine.

Biological control of puncturevine has been successful in the past. There are two species of weevils that have been released in Nevada for control of puncturevine. The puncturevine seed weevil (*Microlarinus lareynii*) feeds upon developing seeds. This insect was introduced into Clark County in 1961. A second weevil, the puncturevine stem weevil (*Microlarinus lypriformis*), is an Italian weevil that mines the



These seeds have been damaged by seed-eating weevils.

stems and roots of the weed. It was released in 1963 in Lincoln County. Both insect species provide good control of puncturevine, although it can take several years to deplete the seed bank in the soil, and both species are sensitive to cold winter temperatures. Currently, populations of the insects are being moved to sites of serious infestation within Nevada.

For larger infestations, in areas with extensive seed banks, or where spot treatments are desired, it may be necessary to use herbicides to control puncturevine. When applied before seeds sprout, preemergence herbicides such as bromacil, chlorsulfuron, dichlobenil, imazapyr, oryzalin, oxyfluorfen, pendimethalin and trifluralin provide control of germinating seeds. Select sites carefully, however, as these products will control all germinating seeds, including desirable species. Certain herbicides such as chlorsulfuron may persist for more than one year, especially in alkaline soils.

A variety of herbicides are available for control of existing plants. Control is provided by post-emergent applications of 2,4-D (amine or LV

ester forms), dicamba, glyphosate, imazamox, imazethapyr, MCPA and MSMA. Follow label directions to determine rates and timing of application. Correct timing is essential for optimal control.

Special care must be taken when applying herbicides near or in streams, rivers, ponds, or lakes, or in areas with shallow water tables. Always read and follow label directions when applying pesticides.

References:

- California Dept. of Food and Agriculture. No date. Puncturevine, <http://www.cdffa.ca.gov/phpps/ipc/weedinfo/tribulus-terrestris.htm>
- Colorado Weed Management. 2000. Puncturevine. Pp. 270-271 in *Creating an Integrated Weed Management Plan, A Handbook for Owners and Managers of Lands with Natural Values*, <http://parks.state.co.us/SiteCollectionImages/parks/Programs/CNAP/CNAPPublications/IntegratedWeedManagement/IWMhandbooktext.pdf>
- Coombs, E.M., J.K. Clark, G.L. Piper and A.F. Cofrancesco, Jr. (Editors). 2004. *Biological Control of Invasive Plants in the United States*. Oregon State University Press, Corvallis, OR.
- DiTomaso, J.M. and E.A. Healy. 2007. *Weeds of California and Other Western States*. University of California Publication 3488.
- Pacific Northwest Weed Management Handbook. Puncturevine. http://uspest.org/pnw/weeds?33W_PROB.pdf
- Parker, R. and R. Boydston. 2007. Puncturevine. Pacific Northwest Extension Publication PNW0133.

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