

SPOTTED SPURGE AND OTHER SPURGES

Integrated Pest Management for Home Gardeners and Landscape Professionals

Spotted spurge (*Euphorbia maculata*) is an annual plant native to the eastern United States. In California, it is the most common species of the spurge family, which also includes creeping spurge (*E. serpens*) and petty spurge (*E. peplus*). These weeds invade many of the state's crops, affecting vegetables, trees, citrus, turf, ornamental beds, and container ornamentals. Management of all the spurges is similar.

IDENTIFICATION

Spotted spurge grows close to the ground, often forming a dense mat (Fig. 1). Its dark green leaves, which grow in pairs called "opposites," are $\frac{1}{8}$ to $\frac{1}{2}$ inch long and about $\frac{1}{8}$ inch wide. Frequently a red spot will mark the leaf halfway down its center vein (Fig. 2).

Flowers, fruit, stems, and leaves are hairy. The short stems have a separate stipule—or little, scalelike appendage—at their base, although you may need a 10X hand lens to see them. Broken stems and branches secrete a milky, poisonous sap. Although spotted spurge sap is being studied as a cure for various skin cancers, in general, the sap of all members of this genus is an eye and skin irritant.

Spotted spurge produces tiny, pinkish flowers (Fig. 3) that consist only of stamens and pistils grouped in small, flowerlike cups, called cyathia, in the leaf axils, the area where the leaf joins the stem. The fruit is a three-celled seed capsule that is $\frac{1}{16}$ inch or less. Each cell contains one seed that is about $\frac{1}{25}$ inch long. The plant's central taproot system is capable of extending more than 24 inches into the soil.

Although spotted spurge is the major spurge weed in California, six other

species of spurges appear regularly as weeds in the state—ground spurge (*E. prostrata*), creeping spurge, petty spurge, garden spurge (*E. hirta*), nodding spurge (*E. nutans*), and thyme-leaved spurge (*E. serpyllifolia*). Ground and creeping spurges are troublesome weeds throughout California, while petty spurge is a problem only in Southern and coastal California landscapes.

All spurges have milky sap, which can be toxic to some animals. Ground spurge (Fig. 4) and creeping spurge (Fig. 5) grow prostrate like spotted spurge but have no markings on their leaves. All spurges reproduce by seed, and creeping spurge also can produce roots along the stem, creating new plants vegetatively. Petty spurge (Fig. 6) is a cool season annual found in shady, moist areas, particularly in flower beds. Native to Europe, it grows upright and is much less invasive than spotted and creeping spurge species. Garden, nodding, and thyme-leaved spurges cause fewer problems.

There are 18 native species of spurge occurring in various parts of California. Some of these native species can appear at the edges of cultivated areas adjacent to wildlands, but they are poorly adapted to cultivated conditions and rarely occur as weeds.

The plant key in Table 1 provides information to help with identifying spurges commonly encountered as weeds in California. Any weedy spurge collected in California that doesn't appear to fit these characteristics can be keyed using *The Jepson Manual* listed in References, or you can take the weed to your local cooperative extension office. The Weed Identification Tool available online through UC Davis' Weed Research

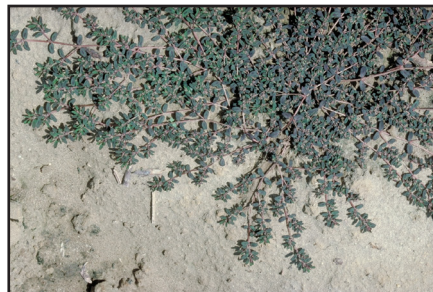


Figure 1. Mature spotted spurge is a low-growing plant.



Figure 2. Spotted spurge with red leaf spots and a broken stem exuding milky sap.



Figure 3. Spotted spurge flowers and leaf spots.

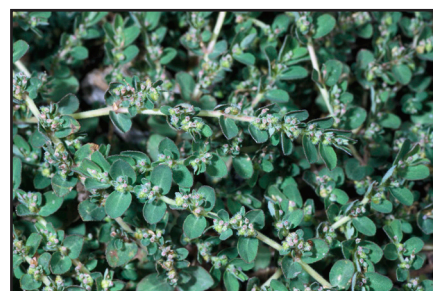


Figure 4. Ground spurge plant.

PEST NOTES

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and Information Center (<http://weedid.wisc.edu/ca/weedid.php>) is an easy-to-use program useful for homeowners and professionals.

BIOLOGY

Most weedy spurges are summer annuals that don't like competition and depend on their prolific seed production for survival. A single plant can produce several thousand seeds, which are small and can remain dormant in the soil until conditions are suitable for germination (sprouting). Seeds produced in summer germinate immediately while those produced in late fall mostly will lie dormant and won't germinate until spring.

Spotted spurge germinates best when temperatures are 75° to 85°F, but germination can occur at temperatures as low as 60°F and as high as 100°F. When moisture is available, germination can occur from February through September in most areas of California. Light also is a requirement for maximum germination; seeds buried deeper than 1/2 inch won't germinate well. Plants that germinate early in spring in cool conditions can remain as small seedlings until temperatures are more

desirable for growth. Once the seed germinates, a small rosette of leaves develops. As growth continues, the leaves form a dense mat that can grow up to 3 feet in diameter. Reproductive growth is rapid, and the plant can produce seeds as soon as 5 weeks after germination.

IMPACT

Spotted spurge can establish itself in horticultural, agricultural, and non-crop sites. It overgrows sparse turf areas and low-growing ground covers, invades open areas in gardens and landscapes, and can grow in sidewalk cracks. In addition to reducing the growth of desirable plants, spotted spurge reduces uniformity and quality of turf, provides a habitat for undesirable insects in citrus groves, serves as an intermediate host for fungal diseases of cultivated crops, and attracts ants with its seed.

Spotted spurge is poisonous and can kill sheep grazing in pastures where it is the predominant weed. Sheep that consumed as little as 0.62% of their body weight of this plant have died within a few hours.



Figure 5. Creeping spurge infesting a field-grown, container plant.



Figure 6. Mature petty spurge.

MANAGEMENT

The primary method of managing spurges is prevention, since controlling these weeds is very difficult once plants have established themselves. Avoid bringing seeds into uninfested areas by using weed-free planting seed

Table 1.

A Key to the Weedy Spurges of California.

Flowers (cyathia) in dense axillary or terminal clusters (generally greater than 10 cyathia per cluster)	Stems erect , to 3 feet tall, sparsely hairy Nodding Spurge (<i>Euphorbia nutans</i> Lagasca)		
	Stems prostrate with numerous, spreading hairs Garden Spurge (<i>E. hirta</i> L.)		
Flowers (cyathia) solitary or paired in leaf axils (Note: Since leaves are opposite, 2 to 4 cyathia will be in close proximity.)	Cyathia, fruit, stem, and leaves hairy	Fruit very sparsely hairy , 1.5–2 mm long; seeds 1–1.25 mm long and wrinkled with low rounded ridges; leaves lacking reddish central spot (rare form) Thyme-leaved Spurge (<i>E. serpyllifolia</i> Persoon)	
		Fruit distinctly hairy ; less than 1.5 mm long; seed generally less than 1 mm, cross-ridge with narrow sharp ridges, or wrinkled; if wrinkled, leaves usually with reddish central spot (very common species)	Seeds cross-wrinkled ; fruit with appressed hairs over entire surface; leaves generally (greater than 95% of plants) with a reddish central spot Spotted Spurge (<i>E. maculata</i> L.)
	Cyathia, fruit, stem and leaves hairless	Stipules (appendages at leaf base) united into a whitish scale between the leaves; stems almost always rooting at the nodes; leaf margins smooth-edged or faintly toothed Creeping Spurge (<i>E. serpens</i> Kunth)	Seeds cross-ridged ; fruit spreading hairy, mostly on edges only; leaves never with reddish central spot Ground Spurge (<i>E. prostrata</i> Aiton)
		Stipules separate and hairlike; stems rarely or never rooting at the nodes; leaf margins distinctly toothed, at least near the tip Thyme-leaved Spurge (<i>E. serpyllifolia</i> P.)	

and uncontaminated planting stock. Clean work clothing and machinery such as lawn mowers to remove any seeds that might be present, and remove spurge plants as soon as you discover them.

Cultural Control

Weeding or cultivating. Constantly monitor infested areas, so you can mechanically till or hand pull new plants before they produce seed. Take care as you weed, since plants that you hand pull often break at the stem, leaving the root and several buds or a single stem from which regrowth is possible. Wear gloves when you hand pull, since the sap can be a skin irritant. Mowing is an ineffective method of control, since most species grow closely to the ground.

When planting new, container-grown ornamentals and ornamental beds, be sure to use sterilized or weed-free planting mix. When purchasing plants for ornamental beds, avoid those with spotted spurge infestations. Mulches can effectively limit spotted spurge if they prevent light from reaching the seed.

Solarization. Before planting an area with turf or ornamentals, you might want to follow the management method known as soil solarization. Covering the soil with sheets of clear plastic for 4 to 6 weeks during the summer can effectively reduce the number of seeds in areas where summer daytime temperatures are very hot. In areas where summer temperatures are lower than 90°F, soil solarization can partially control this weed. For more information, see References, *Soil Solarization for Gardens & Landscapes*.

Mulch. Probably the most common strategy for controlling weeds in ornamental plantings is to use organic or synthetic mulches, which prevent light from reaching weed seeds and seedlings, starving them before they can start making food through photosynthesis. Bark, compost, or straw laid at least 2 inches thick can effectively control many weed seeds including

many spurge species. A large, coarse bark will require a 3- to 4-inch layer to be effective; however, larger, coarser mulches last longer than finely shredded ones. Thick mulch eventually can accumulate soil, decaying organic matter, and weed seeds that can germinate. All organic mulch needs periodic replacement.

Black, synthetic polypropylene weed barriers (fabrics or geotextiles), which are available at nurseries, also block sunlight and starve weed seedlings. The fabrics are porous to allow water to drain through them. Often a synthetic barrier with bark or rock on top makes the area more aesthetically pleasing. Organic mulches such as bark and straw don't need to be as thick if you also are using the fabric. Since mulches and weed barriers reduce evaporation from the soil surface, adjust the irrigation cycle to prevent overwatering.

Turf management. One of the best control measures for spotted spurge in turf is to maintain a competitive stand of grass. When open areas develop in turf due to stress, disease, lack of fertility, insects, or abuse, light penetrates to the soil surface, allowing spotted spurge to germinate. Once spotted spurge establishes itself, altering cultural practices such as fertilization or irrigation won't control it. However, raising the mowing height to 2 inches or more in tall fescue or perennial ryegrass can reduce initial invasions. Check turf for excessive thatch, which should be less than 1/2 inch high.

Food Crops. In home vegetable gardens, you can control spurge seedlings by using soil solarization, mulches, and early cultivation.

Chemical Control

Preemergent herbicides can help prevent spotted spurge outbreaks if you apply them in late winter before weed seeds germinate. Time the application, so it occurs before the soil temperature exceeds 55° to 60°F at a depth of 1 inch.

Preemergent herbicides for turf and ornamentals include benefin (Balan),

pendimethalin (Pendulum), isoxaben (Gallery), oryzalin (Surflan), trifluralin (Treflan, Preen), and dithiopyr (Dimension). Of these, only pendimethalin, trifluralin, dithiopyr, and oryzalin are available for use by home gardeners. Combination products such as oryzalin plus benefin are available to both home gardeners and landscape professionals.

Preemergent chemicals are almost never used in home vegetable gardens, because chemical residues last for months after application, and product labels routinely regulate against such use. Herbicide recommendations for commercial orchard and vegetable crops are available online; see the UC IPM Pest Management Guidelines at <http://www.ipm.ucdavis.edu/PMG/>.

Postemergent herbicides available to home gardeners include 2,4-D/MCPP/dicamba combination products, triclopyr (Turflon), and glyphosate (available for both commercial and home landscape use). In general, 2,4-D and its combinations don't control the larger, more mature spotted spurge plants.

SUGGESTED READING

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Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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