
CREEPING WOODSORREL AND BERMUDA BUTTERCUP

Integrated Pest Management for Home Gardeners and Landscape Professionals

Creeping woodsorrel, *Oxalis corniculata*, is a cosmopolitan weed species that occurs throughout the world. It is most commonly found in California growing below the 2,500 foot elevation level. It is widely distributed in lawns, flower beds, nurseries, gardens, and greenhouses. A related species, Bermuda buttercup (*O. pes-caprae*), is from South Africa and is found in coastal gardens and fields and inland landscaped areas. Bermuda buttercup has been cultivated as an ornamental, and though it is sometimes found in lawns, it usually is only a problem in gardens or shrub areas.

IDENTIFICATION AND LIFE CYCLE

Creeping Woodsorrel. Creeping woodsorrel grows in both full sun and shade in areas that receive adequate moisture. It is a perennial plant (lives for several seasons) that grows in a prostrate manner (low and creeping) and forms roots along its stems where nodes contact the soil (Fig. 1). The leaves of creeping woodsorrel are composed of three heart-shaped leaflets that are attached to the tip of a long stem (petiole). Leaves can range in color from green to purple. The leaves often close and droop at night or under intense light. If creeping woodsorrel plants are stressed from drought or full sunlight, the leaves sometimes turn reddish and wilt.

Flowers of creeping woodsorrel can be found almost anytime during the year and have five small yellow petals ($\frac{1}{8}$ to

$\frac{1}{3}$ inch long) that occur in clusters of one to five at the ends of slender flower stalks. Seed pods are erect, hairy, cylindrical (resembling okra), and $\frac{1}{3}$ to 1 inch long. Creeping woodsorrel seed is rough, reddish, and about $\frac{1}{25}$ inch in length. There are about 10 to 50 seeds per pod, with more than 5,000 seeds per plant. Plants can produce seed even when kept mowed to $\frac{1}{4}$ inch. When seed pods mature, they burst open and forcefully expel the seeds, which may land 10 feet or more from the plant. Because seeds are rough, they adhere to surfaces of machinery or clothing.

Light is required for germination. Optimum seed germination occurs at temperatures between 60° to 80°F, though some germination occurs at lower temperatures. Seed can germinate anytime of year, but most plant establishment takes place in fall. It is not known how long seed remains viable in the soil. Germination is inhibited when seeds are exposed to moist, warm conditions (4 hours of moist heat at 97°F decreased germination of creeping woodsorrel by 96%, and 8 hours stopped it altogether).

The seedling has two round cotyledons (seed leaves), and the first true leaves are a replica of the mature, three heart-shaped leaflets. Creeping woodsorrel grows rapidly from a seedling, forming a fleshy taproot and an extensive rootstock that expands outward. Though flowering seems to occur almost all year, spring is a time of heavy flower-

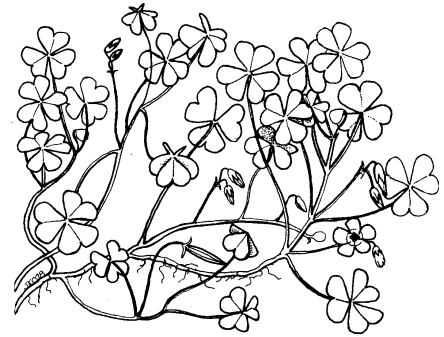


Figure 1. Creeping woodsorrel.

ing and seed formation. Extremely cold or hot temperatures reduce growth, but the plants do not die. If the plant is pulled out, the rootstock often breaks off and remains in the soil, allowing the plant to regrow.

Bermuda Buttercup. Bermuda buttercup is a perennial that grows in full sun in cool coastal areas, but inland it grows primarily in shaded areas. It grows from bulbs in fall and flowers in late winter or early spring. The plant forms a single, short, vertical stem that is mostly underground. The leaves, which are larger and more fleshy than those of creeping woodsorrel and are often spotted with purple, form a rosette on the soil surface. Small, whitish bulblets develop on the stem at the base of the rosette of leaves, and new bulbs form underground. The flowers are bright yellow and from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches in diameter, and the seed pods resemble the bulbs. Bermuda

buttercup reproduces primarily by means of bulbs and spreads when soil contaminated with the bulbs is moved to uninfested areas.

IMPACT

Creeping Woodsorrel. Creeping woodsorrel is a major weed in turf, ornamental plantings, gardens, and nurseries. Uninfested landscapes can become contaminated if infested container stock is used in plantings. As seed pods mature and expel seeds, creeping woodsorrel spreads from container to container, flower bed to flower bed, or across ornamental plantings. Hand-weeding is used extensively to reduce infestations, particularly in commercial nurseries.

Creeping woodsorrel can establish rapidly in semi-shaded areas of new or established grass or dichondra. It also is spread in turf by mowing and other cultural operations. Once established, it is very competitive because it grows all year. This makes it a particular problem in turf species that have a dormant period (e.g., bermudagrass).

Under certain circumstances creeping woodsorrel is known to form lethal concentrations of exudates. It is not known whether this occurs in North America or whether grazing on this weed can cause problems.

Bermuda Buttercup. Bermuda buttercup is grown as an ornamental. Once planted it spreads throughout a garden, competing with other plants. It can spread into edges of turfgrass, but mowing reduces its invasiveness. It is a major problem in field-grown flowers and in the home landscape, especially in groundcovers. Hand-weeding is used extensively to reduce infestations; because it is difficult to remove all of the bulbs, new plants usually appear. Bermuda buttercup is not as invasive as creeping woodsorrel because it spreads primarily from bulbs; however, it is for this reason that it is more difficult to control than creeping woodsorrel.

MANAGEMENT

Creeping Woodsorrel. The primary methods of managing creeping woodsorrel are to remove established plants and to try to control germinating seeds. Seedlings can be controlled by continual hand-weeding or by the use of preemergent herbicides. Burying seeds or covering them with mulch to block their exposure to light prevents germination and is a very effective way to control seedlings in planting beds, but it is not a feasible method for lawns.

Bermuda Buttercup. Bermuda buttercup is mostly found in ornamental beds (only rarely in turf) where its control can be very difficult. Although the top of the plant can be controlled by cultivating or cutting it off, this will not kill the bulb. Because Bermuda buttercup spreads mostly from bulbs rather than seeds, do not move soil from an infested site to one that is free of the weed.

The effectiveness of control methods against creeping woodsorrel and Bermuda buttercup depends on where the weed is growing. The following sections outline specific controls for use in turfgrass, container-grown ornamentals, and landscape plantings.

Turfgrass

Mowing, fertilizing, or irrigating to control creeping woodsorrel is not effective: the more vigorous the turfgrass, the more vigorous the creeping woodsorrel. Creeping woodsorrel survives and sets seed even when mowed as close as ¼ inch. If lawn mowers are used where creeping woodsorrel is growing, wash or air-spray them to remove all seeds and clippings before mowing a weed-free turf.

Cool-season Turfgrass (ryegrass, tall fescue, Kentucky bluegrass, bentgrass). Triclopyr is available for the control of established creeping woodsorrel plants in cool-season turf. Other herbicides currently on the market that mention the control of *Oxalis*

in turf on their labels are mostly ineffective. They may burn the foliage of the woodsorrel, but regrowth is rapid. Often one application of triclopyr is adequate for control, but a follow-up application may be necessary for complete control. Once established plants are controlled, a preemergent application of pendimethalin, isoxaben, oryzalin, dithiopyr, or a mixture of benefin plus trifluralin will control new seedlings. All of these materials can be found at garden centers.

Warm-season Turfgrass (bermudagrass, St. Augustinegrass, zoysiagrass, and dichondra). Currently there are no herbicides available for the control of creeping woodsorrel in warm-season turfgrass. Products containing 2,4-D, mecoprop, or dicamba (many different labeled products) will burn the top of the plant but will not control the weed. If lawn mowers are used where creep-



Figure 2. Bermuda buttercup.

ing woodsorrel is growing, wash or air-spray them to remove all seed or clippings before mowing a weed-free turf.

Bermuda buttercup is not normally found in turfgrasses. Seedlings can be controlled with 2,4-D, mecoprop, and dicamba. Oryzalin alone or in combination with benefin or isoxaben can be used before the seedlings emerge but will not control established plants.

Container-grown Ornamentals

When you plant new containers, use soil that is free of weed seeds. If purchasing container plants, avoid those with *Oxalis* in the pots. If mature woodsorrel plants are found, carefully pull them out so that all of the roots are removed. Fabric or organic mulches will prevent seed germination. Several preemergent herbicides can be used in commercial nurseries to control germinating seeds in containers, including pendimethalin, oryzalin, oxadiazon, isoxaben, dithiopyr, and combinations of oxyfluorfen and oryzalin, or isoxaben and oryzalin. Oryzalin is also available to the home gardener for use in containers. Creeping woodsorrel seedlings may grow at the base of plants, where they escape preemergent herbicide treatment or poke through where mulches are thin. Remove the weeds before they set seed.

Landscape

Control is difficult in areas with shrubs or ground cover, particularly if established creeping woodsorrel plants are not controlled in other areas of the landscape. Total control of established woodsorrel and its seedlings is necessary in turfgrass, shrubs, ground covers, and bedding-plant areas to prevent

creeping woodsorrel from reestablishing. Carefully hand-weed established plants to remove as much of the stem sections as possible because they break easily; several weedings are usually necessary to remove old plants because new plants will grow from the stem segments that remain in the soil. To reduce the chance of further infestation, remove the plants from the site to eliminate their seed. After established plants are removed, apply a mulch or preemergent herbicide to control seedlings. Two types of mulching materials are effective: geotextile fabrics (landscape fabrics) and organic mulches used alone or over the top of the geotextile fabrics. When using organic mulches, cover the soil with 2 to 3 inches of mulch. If any light reaches the soil, seeds may germinate or plant parts may regrow. If seeds drop on top of the mulch, they will usually germinate and grow.

If you are using preemergent herbicides to control creeping woodsorrel, two applications of the herbicide about 6 to 8 weeks apart may be necessary to control all of the seedlings. Because most seeds germinate in fall, make applications of preemergent herbicides at this time. Oryzalin, dithiopyr, pendimethalin, and isoxaben are available for commercial use, whereas only oryzalin can be purchased at garden centers for use around landscape ornamentals. Do not use these materials on bedding plants or injury may result. There are no selective herbicides available to control creeping woodsorrel in ornamental plantings after the weed has emerged.

Cut Bermuda buttercup before it flowers and forms new bulbs. Repeated

cutting or cultivation is necessary to reduce a population. Before planting an infested area, soil solarization can be used to reduce Bermuda buttercup populations. Best results have been obtained if solarization is done for 4 weeks during the months of June, July, or August. (See *Soil Solarization: A Nonchemical Method for Controlling Diseases, Nematodes, and Weeds*, listed in "References"). Glyphosate effectively kills the top growth of this weed, but it is a nonselective herbicide that also kills ornamentals: be careful this herbicide does not drift onto desirable plants. Other herbicides are not effective on Bermuda buttercup beyond the seedling stage or on plants emerging from bulbs.

REFERENCES

- Elmore, C. L., J. J. Stapleton, C. E. Bell, and J. DeVay. 1997. *Soil Solarization: A Nonchemical Method for Controlling Diseases, Nematodes, and Weeds*. Oakland: Univ. Calif. Agric. Nat. Resources, Leaflet 21377.
- Holt, J. S. 1987. Factors affecting germination in greenhouse-produced seeds of *Oxalis corniculata*, a perennial weed. *Amer. J. Bot.* 74(3): 429-436.
- Kingsbury, J. M. 1964. *Poisonous Plants of the United States and Canada*. Newark: Prentice Hall.
- Robbins, W. W., M. K. Bellue, and W. Ball. 1970. *Weeds of California*. Sacramento: State of California Documents and Publications.
- Whitson, T. D., et al. 1996. *Weeds of the West*. Jackson: Univ. Wyoming. 630 pp.

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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.

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 nor pour pesticides down 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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