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# CLOVERS

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*Integrated Pest Management for Home Gardeners and Landscape Professionals*

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Clover is a broad term that refers to plants in three genera: *Trifolium*, *Medicago*, and *Melilotus*. Each contains clover species that are troublesome in turfgrass and ornamental areas. They are in the legume family (Fabaceae) and have distinctive “pealike” flowers that are arranged in various types of heads.

Clover plants have a symbiotic relationship with a bacterium in the *Rhizobium* genus that allows them to fix atmospheric nitrogen and provide for their own nitrogen needs, which is why clover can maintain a dark green color even under low nitrogen fertility. Turfgrass growing in soil that is low in nitrogen may receive supplemental nitrogen from old clover plants as their roots die and decay.

## IDENTIFICATION AND BIOLOGY

Depending on the species, clovers may have an annual or perennial life cycle. Both annual and perennial clovers begin to germinate in fall when soil temperatures are in the 50° to 60°F range. Germination continues throughout the winter and early spring months. Winter rainfall will sustain the annual clovers, but irrigation is required for survival of the perennial species during the dry summer months. A weed commonly confused with clovers is *Oxalis*. *Oxalis* leaves look similar to those of clovers, but lack a stipule and generally have a more pronounced indentation at the top of each leaflet. Once *Oxalis* matures it has small yellow flowers that have five regular petals that are readily distinguished from clover flowers. For more information on *Oxalis* species, see *Pest Notes: Creep-*

*ing Woodsorrel and Bermuda Buttercup* listed in References.

**Annual Clovers.** Annual clovers that typically cause problems in turfgrass include black medic (*Medicago lupulina*) and California burclover (*Medicago polymorpha*). Another of the annual clovers, little hop clover or shamrock clover (*Trifolium dubium*), is sometimes planted as part of a turfgrass mixture.

Annual clovers grow mostly in a prostrate manner, even without mowing (Fig. 1). Black medic and burclover have trailing stems that branch from the base and radiate out from a single taproot. The compound leaves have three oval-shaped leaflets that are finely toothed with prominent veins (Fig. 2). The central leaflet has a short stem whereas the other two are almost stemless. Flowers are small, bright

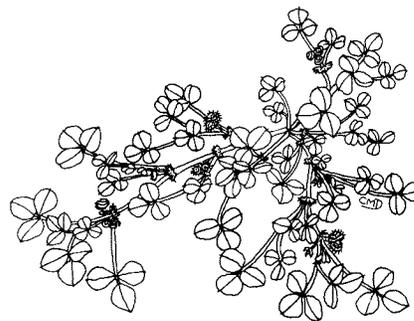


Figure 1. California burclover plant.

yellow, and borne in clusters at the end of a stem. In black medic, a single seed is produced in a smooth, small brown to black pod. The burclover seedpod is light brown and curls into a tight bur that is typically spiny. The burs contain several seeds.

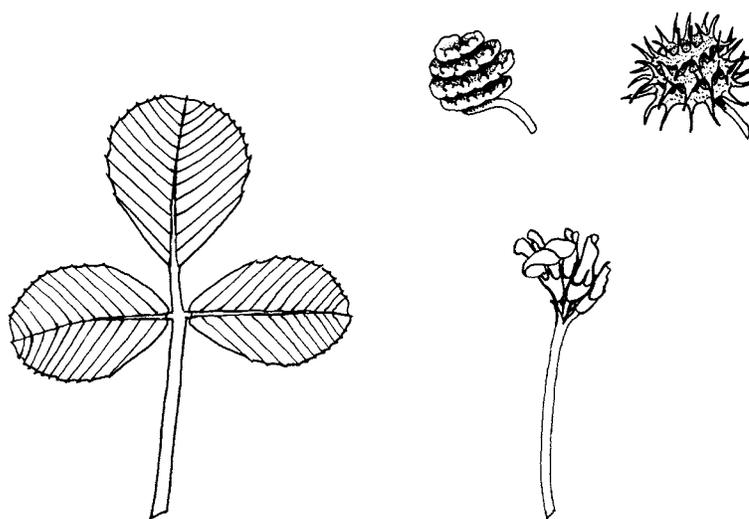


Figure 2. Leaf, seedpods, and flowers of California burclover.

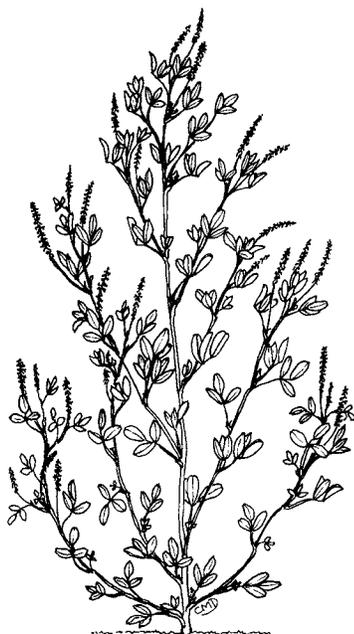


Figure 3. Yellow sweetclover plant.

**Sweetclovers.** Sweetclovers, including white sweetclover (*Melilotus alba*) and yellow sweetclover (*Melilotus officinalis*), are erect annuals or biennials that are more problematic in ornamental areas than in turfgrass. They grow from 2 to 5 feet tall (Fig. 3) and have a trifoliate leaf arrangement with the leaf margins toothed more than halfway back from the tip (Fig. 4a). The flowers are small, yellow or white (depending on the species), and are produced in a many-flowered terminal and in leaf axils (Fig. 4b). The small pods have one seed.

**Perennial Clovers.** The perennial white clover, *Trifolium repens*, is most often found as a turfgrass weed, but it and strawberry clover, *Trifolium fragiferum*, are sometimes planted in a mixed stand with turfgrass to reduce the need for nitrogen fertilizer application.

White and strawberry clovers have a creeping stem system that roots at the nodes (joints in the stem), forming large clumps (Fig. 5). White clover leaves are trifoliate with 1/4- to 1/2-inch-long leaflets (Fig. 6). The flowers of

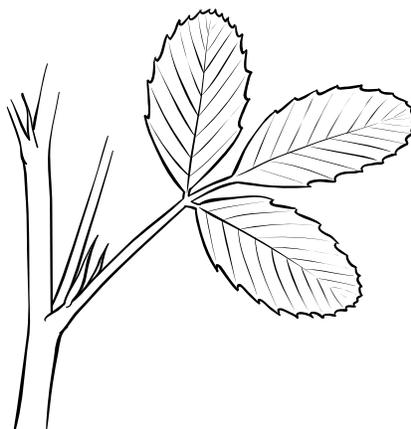


Figure 4a. Leaf of yellow sweetclover.

white clover are formed in heads that are white to pale pinkish. Strawberry clover is a more robust plant than white clover and thus more aggressive. The leaves mostly form from the base of the stem with the leaflets longer and narrower than white clover. The pink flowers are borne in heads that are less showy than white clover.

**IMPACT**

Clover can be a concern in turfgrass or landscaped areas for at least three reasons. First, during the flowering period bees are attracted to the clover blooms and people playing or using the turfgrass may be stung. Second, clovers reduce the uniformity of the turfgrass because its texture, color, and growth rate are different from that of grasses. And third, the mature burs of burclover are a problem for people walking barefoot and when they become attached to clothing or pets.

**MANAGEMENT**

Clovers are relatively easy to control in the home garden by hand-pulling, cultivation, and the application of mulch. In large, landscaped areas herbicides may also be necessary. Because clover seed has a hard seed coat that is very heat tolerant, composting and solarization are not as effective in reducing clover's seed viability as they are with other weed species. The

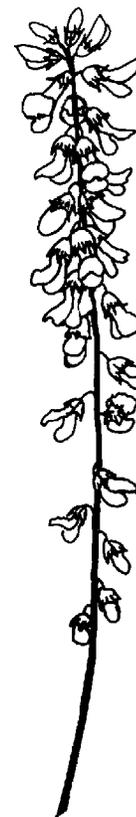


Figure 4b. Flowers of yellow sweetclover.

hard seed coat also allows the seeds to survive longer in the soil than many other weed seeds; clover seeds can germinate over many years, making the control of these plants an ongoing effort.

Once clovers are controlled, change cultural practices in the landscape and turfgrass to reduce the chance of reinfestation. Insuring a thick stand of grass can help exclude clovers in turf. Fertilization can also influence clover growth. For instance, adjust the fertilizer program to include more nitrogen and less phosphorus in turfgrass. Mulches can be effective in excluding clovers and other weeds in landscapes.

**Landscaped Areas.** Annual clovers can be easily controlled by hand-pulling, hoeing, or cultivation. Mulching, depending on the size and depth of the mulch, can prevent seedling establish-

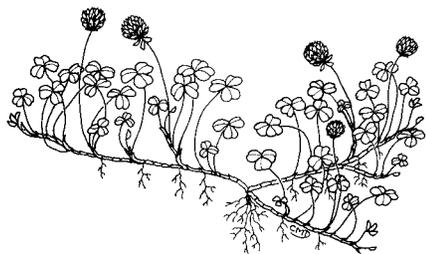


Figure 5. White clover plant.

ment. Before seeds germinate, a 4-inch thick organic mulch (e.g., compost, wood chips, etc.) can prevent establishment of clovers. Organic mulch can also be applied after the seedlings have germinated but must be applied more thicker layer (4 to 6 inches) and must cover the plants completely to block out all light. Organic mulches need to be reapplied each year to maintain the 4-inch-thick layer because they decompose and the thickness of the mulch declines over time. Woven black landscape fabric can exclude weeds over a number of years. Larger plants are more difficult to control with mulching, but they can be hand-pulled or hoed.

**Preemergent Control.** Preemergent herbicides available for landscape use are effective but generally unnecessary in the home landscape where annual clovers are easily controlled by the methods mentioned. For landscape professionals, herbicide formulations that contain isoxaben are effective for controlling annual clovers and can be used around many woody shrubs and trees. Most established annual flowers tolerate this herbicide. Herbicide formulations containing oryzalin, trifluralin, or pendimethalin will control most grass species and some broadleaf weeds but will miss many other broadleaf species (mustard, aster, legume, and cheeseweed families).

**Postemergent Control.** Postemergent control of clover is difficult. If the seedlings are small, glyphosate can be used in open areas provided desirable plants are not sprayed. Once annual clover plants reach 3 to 4 inches in

height, control with herbicides is more difficult. The top may be burned, but the plants often regrow. None of the herbicides used in turfgrass for clover control is safe to use in ornamental plantings because they can damage desirable plants.

Perennial clovers can also be controlled with glyphosate when the plants are seedlings, but once the clover is established, it cannot be controlled except by digging it out. Glyphosate at high rates will suppress some clovers.

**Turfgrass Areas.** Yellow turf and green clover is a good indication of low nitrogen fertility. The invasion of clover into turfgrass can be reduced by using levels of nitrogen fertilizer that will promote grass growth but not the growth of clover; this can be achieved by applying 1 pound of active nitrogen per 1,000 square feet of turfgrass during each month of active turfgrass growth (not to exceed 4 lb active nitrogen/1,000 sq ft/year). Also, high phosphorus in the soil promotes the invasion of clovers. However, nitrogen applications should be carefully calculated and applied to avoid runoff of excess fertilizer to municipal drainage systems. Clover in established turfgrass cannot be controlled by fertilization or mowing of the grass. Once clover is established, the annual clovers can be controlled by hand-pulling before seeds are formed. Hand-pulling will need to be repeated as new germination occurs and desirable turfgrass is planted in weeded areas.

**Herbicide.** Both established annual and perennial clovers can be controlled with postemergent herbicides. The best herbicide to use depends upon the species of turfgrass. Warm-season turfgrasses such as bermudagrass, zoysiagrass, and kikuyugrass will tolerate products containing mecoprop and dicamba but not triclopyr. Cool-season turfgrasses will tolerate all of the herbicides that control clover. The herbicide 2,4-D is not effective for clover control; it will injure the plant but does not control it.

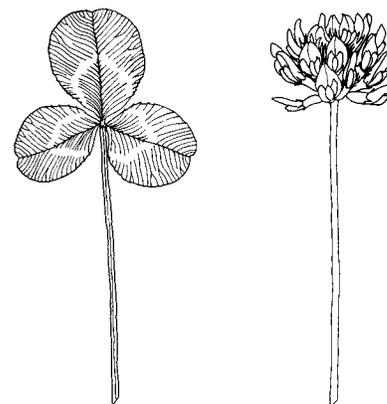


Figure 6. White clover leaf and flower.

## REFERENCES

<sup>1</sup>Elmore, C. L., and D. W. Cudney. Aug. 1997. *Pest Notes: Creeping Woodsorrel and Bermuda Buttercup*. Oakland: Calif. Agric. Nat. Res. Publ. 7444. Also available online, <http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pncreeping-woodsorrel.pdf>.

<sup>1</sup>Elmore, C. L., C. A. Wilen, D. W. Cudney, and V. Gibeault. July 2000. *Weeds from UC IPM Pest Management Guidelines: Turfgrass*. Oakland: Calif. Agric. Nat. Res. Publ. 3365-T. Also available online, <http://www.ipm.ucdavis.edu/PMG/selectnewpest.turfgrass.html>.

Hickman, J. C., ed. 1993. *The Jepson Manual Higher Plants of California*. Berkeley: Univ. Calif. Press.

<sup>1</sup>LeStrange, M., and C. A. Reynolds, Jan. 2004. *Pest Notes: Weed Management in Lawns*. Oakland: Calif. Agric. Nat. Res. Publ. 74113. Also available online, <http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnclovers.pdf>.

Whitson, T. D., ed. 2000. *Weeds of the West*, 9th ed. Jackson, WY: Western Society of Weed Science. ❖

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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.

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