

FIELD BINDWEED

Integrated Pest Management for Home Gardeners and Landscape Professionals

Field bindweed, *Convolvulus arvensis*, (Fig. 1) is a native of Eurasia and was first documented in California in 1884 when it was collected in San Diego. By the first quarter of the twentieth century, field bindweed was proclaimed the worst weed in California and many of the western states. It most likely arrived in the United States as a contaminant in farm and garden seeds. However, because of its flowers and climbing nature, some seeds were probably planted as ornamentals, either as a ground cover, in hanging baskets, or on trellises. Field bindweed has been given many names including perennial morningglory, creeping jenny, bellbine, sheep-bine, and corn-bind.

IDENTIFICATION

The first two leaves (cotyledons) of a field bindweed seedling are nearly square with a shallow notch at the tip (Fig. 2). Plants that arise from rhizomes (underground stems) lack seed leaves. The first true leaves are arrowhead shaped and have petioles (leaf stems) that are flattened and grooved on the upper surface.

Mature field bindweed plants have arrowhead-shaped leaves that can be between ½ to 2 inches long, depending on environmental conditions. Mature leaves at the base of the stem are larger than the young leaves at the stem terminal. The flowers are trumpet shaped, white to pink in color, and 1 to 1½ inches wide. Field bindweed is a prostrate plant unless it climbs on an object for support. It is often found growing on upright plants, such as shrubs or grape vines, with its stems and leaves entwined throughout the plant and the flowers exposed to the light. Under

warm, moist conditions, leaves are larger and vines more robust than under drought conditions. The root system has both deep vertical and shallow horizontal lateral roots (Fig. 3). The vertical roots can reach depths of 20 feet or more. However, 70% of the total mass of the root structure occupies the top 2 feet of soil. Most of these lateral roots are no deeper than 1 foot. Experiments on bindweed have shown that its root and rhizome growth can reach 2½ to 5 tons per acre.

In contrast to field bindweed, the ornamental annual morningglory has a larger (2 inches wide), more showy flower that may be white to blue or purple in color, a thicker stem that is sometimes hairy, and heart-shaped leaves that are 1½ inches wide and 2 inches or more long. The two species are easy to distinguish from each other.

LIFE CYCLE

Field bindweed is a hardy perennial found throughout California below 5,000 feet elevation. It spreads from an extensive rootstock as well as from seed. Most parts of the bindweed roots

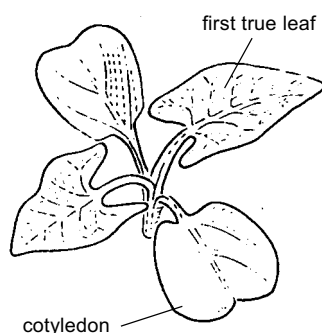


Figure 2. Field bindweed seedling.



Figure 1. Field bindweed.

and rhizomes can produce adventitious buds, which can create new roots and shoots. Roots capable of budding are found to depths of 14 feet. Fragments of vertical roots and rhizomes that are as short as 2 inches can form new plants. Lateral roots serve another important function. At about 15 to 30 inches from the parent plant, a lateral often turns downward, becoming a secondary vertical root, and sends out both roots and shoots from the turning point. By this means a single field bindweed plant can spread radially more than 10 feet in a growing season. This extensive underground network allows for overwintering without foliage, and it can persist for many years in the soil.

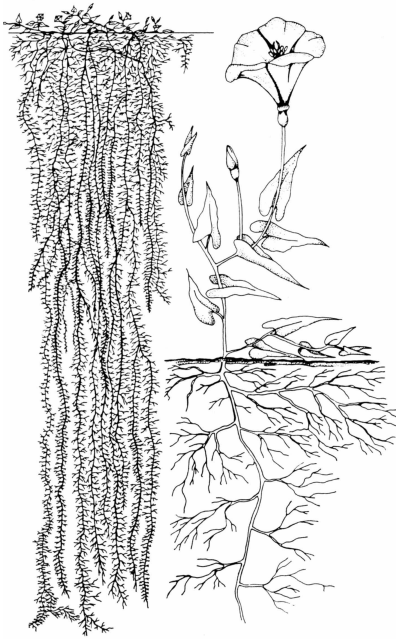


Figure 3. Root system of field bindweed.

One to four dark brown seeds are produced in round, smooth, 1/4-inch capsules. An average plant produces about 550 seeds. Within 1 month after forming, the seed coat matures and becomes impervious to water. Seed that is 60 years old has been found to be alive, and the seed are commonly found in the soil seedbank. Once the seed coat is weakened, seed will germinate at temperatures of 41° to 104°F.

Drought tolerance is a characteristic of field bindweed. In California, it seems to prefer heavy clay soils rather than sandy soils. When water is withheld, bindweed competes better than most other plants. If an area is well watered, ornamentals may compete better than the bindweed. In the landscape, field bindweed will survive with sprinkler or drip irrigation. If there is no summer water, the plant reduces its seed production first and then reduces growth and leaf size, but some flowers and seed are still produced.

IMPACT

Field bindweed is one of the most persistent and difficult-to-control weeds in

ornamentals, orchard and vine crops, and field crops. It has a vigorous root and rhizome system that makes it almost impossible to control with cultivation. Its seed has a long dormancy and may last in soil for up to 60 years. It has a climbing habit that allows the plant to grow through mulches. Field bindweed is also very drought tolerant and once established is almost impossible to control with herbicides.

If field bindweed is present, agricultural land is devalued and the weed precludes planting of certain crops such as onions, melons, and tomatoes.

MANAGEMENT

Control of field bindweed is not easy, and it cannot be accomplished with a single treatment or in a single season. Effective control requires prevention of seed production, reduction of stored carbohydrates by deep tillage of the root system, competition for light from other plants, and constant vigilance in removing top growth.

Prevention

There are three practices that can reduce the possibility of introducing field bindweed. Purchase and plant clean seed and ornamental stock; remove any seedlings before they become perennial plants; and prevent any plants from producing seed. If topsoil is introduced to a site, it should be free of propagules and seeds. It is important to control new infestations when they are small, because spot control is least expensive and the most effective.

Cultural Control

Experiments in some annual and perennial crops have demonstrated the effect of shade on bindweed growth. In these studies alfalfa, cereal grains, and corn reduced bindweed growth. Shrubs and trees should also reduce growth, especially if there is another planting under the trees and the bindweed is not allowed to climb above the foliage of these plants.

Seedlings of field bindweed are easy to control with cultivation, but only for

about 3 to 4 weeks from germination. After that, perennial buds are formed, and control is much more difficult.

Cultivation or hoeing has been partially effective in reducing established stands of field bindweed. Cultivate about every 2 to 3 weeks, as soon as the bindweed reaches 6 inches in length, and repeat whenever necessary. In conjunction with cultivation, withholding water to dry the site may help to reduce the perennial population in a summer season.

Black polyethylene mulch has been effective for bindweed control *if no light is allowed to reach the soil and the plant*. The edges of the plastic must overlap so that the bindweed stems cannot grow between the sheets and into the light. Landscape fabrics have also been effective if all light is excluded. If holes are made in the fabric or plastic for plants, however, bindweed can also grow through these holes. A landscape fabric placed over soil, then covered with bark or other plant-derived product (organic matter) or rock, will control field bindweed. It may take more than 3 years of light exclusion before the bindweed is killed. Once the plastic is removed, new bindweed plants may germinate from seed in the soil; be sure to monitor the site and control any new seedlings.

Chemical Control

Herbicides have been relatively effective for suppression of bindweed, but have not been very effective for eradication (Table 1). If herbicides are used, supplement them with appropriate preventive and cultural controls.

Turfgrass Areas. In turfgrass areas field bindweed is not normally a problem because frequent mowing reduces its vigor, though once established it will persist. For control, products containing 2,4-D and/or dicamba have been effective without injuring the grass turf. More than one application will have to be made during the summer growing season. Mowing the turfgrass will not get rid of bindweed. Bindweed often will flower above the turf.

Ornamental Areas. In ornamental landscape settings, field bindweed grows between and up through the canopy of plants. For control, products containing trifluralin, oryzalin, or pendimethalin applied before emergence will reduce emerging perennial shoots and control the germinating seedlings, but they will not kill established bindweed plants. In open areas where there are no desirable plants, glyphosate (Roundup and other formulations) should be applied when bindweed plants are flowering but before seed is produced. Glyphosate takes awhile (2 to 3 weeks, depending upon temperature at treatment) to kill the top growth, but it is effective, even though eradication is not always possible. Glyphosate does not have residual activity. It will not affect germination of field bindweed seed, so new seedlings will have to be controlled with mulch, preemergent herbicides, or cultivation.

Some people have used a 2 to 4% solution (volume to volume) of glyphosate to paint the leaves of bindweed in shrub areas, but if you try this be sure not to allow the herbicide to touch ma-

ture leaves or green bark of ornamental shrubs or trees or injury may result. To reduce the chance that glyphosate will contact desirable plants, place the bindweed vines on newspaper before painting the leaves with glyphosate. Once the glyphosate solution has dried on the bindweed leaves, the newspaper can be removed. Any regrowth of the field bindweed must be retreated.

If an area infested with bindweed is to be planted, cultivate the field bindweed to cut it into smaller sections, irrigate the area to make the bindweed grow well, and then treat the field bindweed with glyphosate before planting. After planting, use a preemergent herbicide or mulch and continue to control any seedlings or regrowth from the previously treated plants.

Orchard and Vineyard Areas. In orchards or vineyards where bindweed is growing beneath the branches or canes, glyphosate can be applied safely to the bindweed under the woody crop plants without injuring them. For best control apply glyphosate to the bindweed

when it begins to bloom. Glyphosate applications in fall when the bindweed is actively growing are also effective, but spring treatment has the additional benefit of reducing seed production by this weed. Generally, additional applications need to be made when the bindweed regrows. Seedlings must be controlled with mulch, cultivation, or preemergent herbicides before they become established plants. Repeated cultivations are required to prevent bindweed from reestablishing. Because the seed lasts such a long time in the soil, control practices must be conducted continuously.

Noncrop Areas. In areas outside the landscape or orchard, cultivation and herbicide treatment can be used. If herbicides are to be used, treat the bindweed plants before they are drought stressed. Use a translocated herbicide, such as glyphosate or a combination of glyphosate and dicamba in areas where its use is allowed, at the flowering stage of growth. The addition of dicamba gives the treatment some soil residual activity that helps with control of new seedlings. Re-treatments will be necessary to control both established plants and seedlings. If possible, grow a competitive planting of other plants to reduce field bindweed growth.

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Table 1. Summary of Herbicides¹ for Use Against Field Bindweed.

Site	Material	Applied to soil before seeds germinate	Applied to actively growing plants
Turfgrass	2,4-D	no	yes
	dicamba	no	yes
Ornamentals	glyphosate	no	yes
	oryzalin	yes	no
	pendimethalin	yes	no
	proflaminate	yes	no
	trifluralin	yes	no
Orchard/Vineyard	glyphosate	no	yes
	trifluralin	yes	no
Noncrop areas	dicamba	no	yes
	glyphosate	no	yes

¹ All materials listed are readily available for use by home gardeners.

For more information contact the University of California Cooperative Extension or agricultural commissioner's office in your county. See your phone book for addresses and phone numbers.

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

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WARNING ON THE USE OF CHEMICALS

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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