

## YELLOW STARHISTLE

*Centaurea solstitialis*

Sunflower Family (Asteraceae)

### DESCRIPTION

This winter annual (or sometimes biennial) is considered to be California's worst rangeland weed. It is also found on disturbed sites and annual grasslands, and affects access to recreation areas.

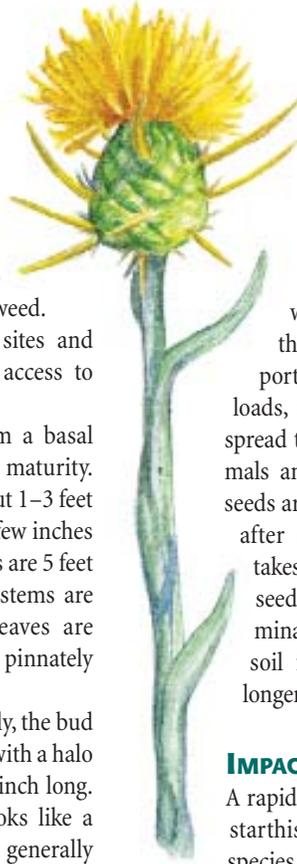
Yellow starthistle plants form a basal rosette as juveniles, then bolt in maturity. Flowering plants are usually about 1–3 feet tall, though some may be only a few inches and single-stemmed while others are 5 feet tall and branching. Leaves and stems are downy and gray-green. The leaves are alternate, 2–3 inches long, and pinnately lobed with triangular tips.

The flowers develop terminally, the bud appearing like a small scaly ball with a halo of stiff yellowish spines up to 1 inch long. The composite inflorescence looks like a fuzzy ball of tiny petals. Flowers generally bloom from May to September, but in the Bay Area a few plants bloom at any time of year.

### REPRODUCTION

Yellow starthistle reproduces solely by seed. The plants produce two kinds of seeds: plumed and plumeless, both measuring roughly a quarter-inch. Most seeds are plumed with a tuft of soft, white bristles that aid in wind dispersal. These seeds are pale (cream to tan) and develop on the inner (disk) part of the flower. The plumeless, outer (ray) seeds are darker brown. They remain attached to the flower head until it drops on the ground.

Large plants can produce as many as 1,000 composite flower heads which together can pro-



duce almost 75,000 seeds in a single season. Most seeds are wind-dispersed, but they spread the greatest distance by being transported in contaminated hay or seed loads, or attached to vehicles. They are spread to a lesser degree attached to animals and humans. About 90 percent of seeds are ready to germinate immediately after release. Germination frequently takes place after the first fall rains, as seeds need moisture and light to germinate. Seeds can remain viable in the soil for 3 years and possibly much longer.

### IMPACT

A rapidly growing taproot enables yellow starthistle to outcompete native plant species, including purple needlegrass, for summer soil moisture. Yellow starthistle may also produce allelopathic compounds that give it another competitive edge. The current level of infestation in California (estimated at 22 million acres) has brought agricultural and economic loss by reducing the quality and yield of forage. It can be fatally poisonous to horses and its spines deter other livestock from grazing.

### KEY FACTORS

- u High seed production.
- u Seed longevity is at least 3 years.
- u Fast-growing and deep taproot.
- u Seedlings are somewhat shade-intolerant.

## TREATMENT OPTIONS

u **Pull or dig** individual plants by hand in May–June, when plants are bolting or as soon as possible afterwards. (Rosettes often break off from roots, which resprout.) Grasp the plant at the base and pull steadily, straight up. Where several plants grow close together, digging or pulling smaller ones often makes it easy to pull others. Cutting lateral roots and loosening the soil around the base also make it easier to pull. If you cannot pull up the plant, cut it or twist it off at the base.

Hand pulling is often difficult if plants have stems more than a quarter-inch in diameter. Use a narrow spade, soil knife, or other tool to help free or cut the root. Given that this weed is an annual, most of the taproot can be left in the soil, especially if you manage to get a quarter- to a half-inch of the root below the root crown.

Continue to recheck and pull emerging plants through August, preferably even later. Hand-pulling can be done in conjunction with mowing: mowing can keep plants from setting seed until you have time to pull.

Heavy leather gloves are a must! Working with yellow starthistle, the chemicals eventually soak into skin and can be tasted. Although the toxins are not known to harm humans, wash hands after working with this plant.

u **Mow** (or cut with a hand scythe, brushcutter, or any cutting tool) after the plants have bolted and a small fraction of the buds (about 2 percent) have started to bloom. Make sure you mow close enough to the ground to get the lowest buds. Aim to leave 1–2 inches above ground. You may need to mow a second or even a third time at 4–6 week intervals.

Mowing too early can encourage greater seed production, so it's crucial to time the removal carefully. If there are no buds, it's too early, but if the flowers have mostly bloomed and are losing their bright yellow color, it's too

late. Occasionally starthistles bolt sideways with flower heads much closer to the ground, or mowed plants may rebloom very low. You can take the tops off these with a shovel, hoe, or mattock, if in small numbers. Cutting is most effective on dry soil, otherwise a repeat treatment is necessary roughly 4 weeks later.

- u **Graze** with cattle, goats, and sheep to help contain plants and reduce seed production. Cattle don't eat mature spiny plants, but goats and sheep are less picky! Best results come from intensive grazing by a large number of animals for a short period of time, preferably from the end of May to June, just after plants have bolted. Research suggests grazing at the rosette stage is counterproductive, leading to an increase in yellow starthistle. This weed is toxic to horses.
- u **Foliar spray.** A 1 percent dilution of glyphosate can be sprayed on plants at the bolting stage. You might use this for spot application.

## DISPOSAL

Some practitioners advise leaving the clippings from each mowing on-site (as long as they do not contain seeds) to protect the soil from rein-festation by other invasive species, and also to discourage yellow starthistle seedlings by providing extra shade. Plants with only buds and young, pale yellow flowers can be left on the ground. Once flowers turn darker yellow, pulled plants should be bagged, as they may produce viable seed. Dispose of the bags off-site where seeds can't disperse elsewhere. East Bay Regional Park District uses clear plastic bags and leaves the plants in them for a few years.

## FOLLOW-UP

A removal program should last at least 3 years and probably longer, though at lower intensity. Watch for new infestations in nearby areas. Mulching may be helpful in shading out seedlings. Some experiments show that a 5-inch

layer of wheat straw (or rice straw) stops all regrowth. This level of coverage might be expensive, however, and therefore only an option for small patches.

### **INTERESTING FACTS**

Native to the Mediterranean, yellow starthistle was introduced to the US in the mid-1800s, probably as part of a shipment of contaminated grain or other crop seed. Beekeepers find it to be a valuable source of nectar for honeybees, which account for a large proportion of the thistle's pollination.

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## **Notes**