VELVETLEAF
(Abutilon theophrasti Medic.)

SEEDLING DESCRIPTION

The stem of velvetleaf is green, often with a purple tinge near the soil surface. It has a dense covering of short, soft hairs, some with microscopic glands. The seed leaves (cotyledons) on both surfaces are covered with short, velvety hairs. Main veins are evident on both leaf surfaces as lines originating from a common basal point. Leaf stalks are generally green, sometimes with a purple tinge.

The true leaves are heart-shaped and covered with velvety hairs. Close inspection of the hairs reveals that many are star shaped. The leaves often droop. Leaf veins appear as slight depressions on the upper surface and as ridges on the lower surface. Leaf stalks are flattened on the upper surface and densely hairy.

BIOLOGY

Velvetleaf is a summer annual that grows from seed each year, attaining heights of 1 to 5 feet (0.3 to 1.5 m). Mature plants are generally unbranched and have a strong taproot and sturdy stem that becomes woody at maturity. Leaf blades are 2.4 to 7 inches (6 to 18 cm) long and 2 to 6 inches (5 to 15 cm) wide. Leaf stalks are half as long as the leaves. The plant

1. Seedling showing heart-shaped cotyledons.
2. Mature plant with flower buds and velvety leaves.
3. Velvetleaf in flower.
4. Distinctive "butterprint" seed capsule.

Velvetleaf reproduces from seed. A single large plant can produce up to 8,000 seeds. Seeds dropped by the parent plant are dormant at least until the following spring, but under certain conditions can remain dormant for up to sixty years. The long period of seed dormancy is primarily due to a hard seed coat. The seeds of velvetleaf are kidney shaped and lined with sparse, short hairs along the inner edges of lobes. Seeds are grey-brown to brown-black and about ⅛ inch square (3.0 to 3.6 mm long and 2.2 to 2.6 mm wide).

The seeds begin to germinate in mid-May. Maximum emergence is from seeds buried within an inch of the surface; a 50 percent reduction in germination occurs with each additional inch of depth. The seeds may survive in soil for sixty or more years and tend to accumulate, forming large seed banks. The seed banks can be reduced by tillage, which moves the seeds closer to the soil surface where conditions favor germination. A study in Minnesota showed that four years of intensive cultivation of fallow land reduced the velvetleaf seed population by 90 percent, but the remaining 10 percent equalled 5.8 million seeds per acre (13 million seeds per hectare) in the upper 9 inches (23 cm) of soil. In the same study, 56 percent of the original seed population remained after four years in an undisturbed stand of alfalfa, and 37 percent remained in undisturbed land kept weedfree by continuous chemical fallow. Thus, the longevity of velvetleaf seeds is greater in undisturbed soils than in cultivated soils. The seed population in cultivated crop lands can be immense. A study in continuous corn fields in Nebraska revealed a population of 20.6 million viable seeds per acre (51 million seeds per hectare) in the top 8 inches (20 cm) of soil.

Velvetleaf is a problem weed in row crops, especially corn and soybeans. The amount of damage velvetleaf does to a crop depends on its emergence time in relation to crop emergence time. Velvetleaf plants that emerge early and begin growing at the same time as the crop are much more competitive and prolific than late-flowering. When velvetleaf emerges three weeks after soybeans, no yield loss occurs, because shading by the soybeans slows the growth of velvetleaf.

Velvetleaf contains allelopathic (toxic) chemicals that inhibit water uptake and chlorophyll production in many crop plants, especially soybeans. These chemicals are found in the microscopic glands at the base of the stem hairs. Rainfall washes the chemicals off the plant and into the soil, where they exert their toxic effect.

SIMILAR SPECIES

Several other plants, such as morning-glories, violets, and wild buckwheat, resemble velvetleaf in having heart shaped leaves, but they all lack the dense, velvety hairs of velvetleaf.

NATURAL HISTORY

Velvetleaf was introduced from India into the United States as a garden plant, escaped from the garden, and now is found in most areas. It has become colonized in the eastern provinces of Canada as well as throughout the United States, except for an area along the northern boundary. Velvetleaf is most common in warm regions. It thrives in vacant lots, gardens, and cultivated fields, especially those planted to corn and soybeans.

In its native land, velvetleaf is used to make thread, fibers, and woven fabric. In China, the stems are used in making twine or rope. The mature capsule was once used to make designs on homemade butter, hence the name butterprint.

Velvetleaf is known by other common names, including buttonweed, cotton weed, Indian hemp, Indian mallow, pie maker, and velvetweed.

CONTROL

The considerable dormancy of velvetleaf seeds makes the plant a long-term problem once it has gone to seed. Therefore, preemergence and postemergence control measures are essential. To preserve yields, control needs to delay velvetleaf emergence only until the crop produces a percent seed population decline per year when no new seeds were produced. In continuous alfalfa, the decline was 15 percent per year. After five years, 8 percent still remained in corn and 44 percent in alfalfa. To prevent yield reductions, control measures must hinder seed production and delay seedling emergence.

Velvetleaf is also difficult to control because from late evening until early morning its leaves go through a sleep cycle in which they droop to a nearly vertical position. Drooping leaves catch less herbicide than do horizontal ones. Therefore, the most effective way to control velvetleaf with herbicides is to spray during the day when leaves are more nearly horizontal.

A soil-applied herbicide treatment followed by a postemergence treatment is generally most effective in controlling velvetleaf. A postemergence treatment may not be economical in many cases, but by preventing plants from going to seed, it can prevent further velvetleaf problems. The prevalent practice of reducing broadleaf control and using preemergence herbicide combinations, such as Lasso-atrazine, increases the need for postemergent control of velvetleaf. Postemergence treatments should not be delayed too long because herbicides lose their effectiveness on velvetleaf at the six-leaf stage. Drought stress can also hamper postemergence control.

Refer to the herbicide labels and the most recent *Weed Control Manual* for herbicide formulations, application rates, timing, safety, and other useful information.

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