

Verbascum thapsus

Common mullein

Scrophulariaceae

Forest Starr, Kim Starr, and Lloyd Loope
United States Geological Survey--Biological Resources Division
Haleakala Field Station, Maui, Hawai'i

March, 2003

OVERVIEW

Verbascum thapsus is an herbaceous plant native to Europe that is cultivated and naturalized in temperate areas of the world, including North America, Hawai'i, Reunion, Australia, and New Zealand. The plant can become invasive by quickly colonizing disturbed areas. *V. thapsus* plants produce numerous seeds that may remain dormant in the soil for over 100 years. *V. thapsus* is a state noxious weed in Colorado and Hawai'i (PLANTS 2003). In Hawai'i, *V. thapsus* is known from the Island of Hawai'i, where it infests roadsides at elevations from 5,000-10,000 ft (1,524-3,048 m) and is particularly dense around 6,562 ft (2,000 m) forming a monotypic cover that can out-compete native vegetation. It is feared that *V. thapsus* could do the same in similar native alpine ecosystems on Maui. In the 1980's, two plants were detected and eradicated in Haleakala National Park. In addition, plants were being cultivated by a plant grower in Kula. All plants have been destroyed. Recently (2003), *V. thapsus* was again observed being cultivated in Kula. Early detection and control in natural areas as well as public education on noxious weed species are both needed to help keep *V. thapsus* from invading on Maui.

TAXONOMY

Family: Scrophulariaceae (figwort family) (Wagner et al. 1999).

Latin name: *Verbascum thapsus* L. (Wagner et al. 1999).

Synonyms: None known.

Common names: Woolly or common mullein, flannel or velvet plant, Aaron's rod, Adam's flannel, beggar's blanket, beggar's flannel, beggar's stalk, big taper, blanket herb, blanket leaf, bullock's lungwort, and numerous others (Brickell and Zuk 1997, Wagner et al. 1999, OSU 2003).

Taxonomic notes: The genus *Verbascum* is comprised of 360 species found mostly on dry, stony hillsides, wastelands, and open woodlands of Europe, North Africa, and West and Central Asia (Brickell and Zuk 1997).

Nomenclature: The genus name, *Verbascum*, may be derived from the Latin word, *barbascum*, which means bearded plant. The common name, mullein, is derived from the Latin word, *mollis*, which means soft (OSU 2003).

Related species in Hawai'i: Two other *Verbascum* species are documented from Hawai'i, *Verbascum blattaria* and *Verbascum virgatum*. *V. blattaria* (moth mullein), native to Eurasia and widely naturalized in temperate areas, is known from a single collection made in 1955 from a pasture in Humu'ula, Hawai'i, 1,980 m (6,496 ft) elevation (Wagner et al. 1999). *V. virgatum* (virgate or wand mullein), native to western

Europe and occasionally naturalized in temperate areas, is known from near Hale Pohaku Ranger Station and near the David Douglas monument and Ka'u District, Hawai'i (Wagner et al. 1999). Numerous other *Verbascum* species are cultivated throughout the world and may likely be cultivated in Hawai'i as well.

DESCRIPTION

"Stout biennial herbs 3-20 dm tall in the second year, densely yellowish woolly tomentose throughout, the hairs stellate or dendritic. Basal leaves obovate to oblanceolate, 8-50 cm long, 2.5-14 cm wide, densely yellowish or whitish woolly tomentose, margins entire to shallowly crenate; cauline leaves becoming progressively smaller toward the inflorescence, oblanceolate, sessile and decurrent on stem. Flowers in compact, spike-like panicles, pedicels partly adnate to the stem; calyx (5-)8-12 mm long, the lobes lanceolate; corolla yellow, rarely white, 8-15 mm long, scurfy pubescent externally, sometimes also ciliate, the hairs stellate; upper 3 staminal filaments villous with yellow hairs, the lower 2 glabrous to sparsely villous. Capsules broadly ovoid to elliptic-ovoid, 0.7-1 cm long, densely tomentose with stellate or branched hairs." (Wagner et al. 1999).

The following description appears in Hovshovsky (1986) and is derived from Abrams (1951), Munz and Keck (1973), and Gross and Werner (1978). "Biennial, perennial or, rarely, an annual with a deep tap root. In its first year it produces a low vegetative rosette up to 60 cm in diameter which overwinters and is followed in the succeeding growing season by a stout flowering stem 5-18 dm tall. The basal leaves are oblong-obovate to obovate-lanceolate and 10-40 cm long including the petiole. The flower stem is longitudinally ridged by the bases of decurrent leaves and is densely woolly with branched hairs. Cauline leaves are elliptic-lanceolate, decurrent, and gradually reduced up the stem. The inflorescence is a spike-like raceme 20-50 cm long and approximately 3 cm in diameter. It is usually very dense; rare axillary racemes may arise from the upper leaves. The sessile flowers are usually one per axil with pedicels less than 2 mm and slightly irregular with rotate corollas. The calyx consists of 5 lanceolate or ovate sepals, 7-9 mm long with caudate tips. The corolla is 20-25 mm broad consisting of five yellow (rarely white) petals. Fruit is an ovoid, stellate-pubescent capsule 3-6 mm long, which splits into two valves at maturity. There are numerous brown seeds, 0.5-1.0 mm long which are six-sided and have angular lateral surfaces with rows of pits."

BIOLOGY & ECOLOGY

Cultivation: *Verbascum thapsus* has long been cultivated as a medicinal herb and for numerous other purposes. The leaves have been used as lamp wicks and Romans dipped the plants in fat to light as torches. Romans also extracted a yellow dye from the flowers to coloring women's hair (OSU 2003). *V. thapsus* has been cultivated as a remedy for coughs and diarrhea, to provide a stimulant when smoked, as a fish poison, for use in mosquito larvae control, and as an ornamental garden plant (Gross and Werner 1978).

Invasiveness: *V. thapsus* has become naturalized in North America and other temperate regions of the world, including Australia and New Zealand (Juvik and Juvik 1992). *V. thapsus* can thrive in a variety of habitats and is a pioneer species, quickly colonizing disturbed roadsides, pastures, and woodland margins. The plant spreads rapidly through

production of numerous seeds (up to 100,000-180,000) per plant, which are produced during the second or third year of growth, and can remain dormant for greater than 100 years (Gross and Werner 1982). In fact, viable seeds have been found in the soil samples archaeologically dated from 1300 A.D. (Gross and Werner 1982), pushing the potential seed dormancy to over several hundred years. *V. thapsus* is invasive in Hawai'i and Reunion Islands where it forms thick infestations in dry, rocky disturbed areas at elevations ranging from 5,000-10,000 ft (1,524-3,048 m), and threatens to degrade native plant communities in the alpine zone (Juvik and Juvik 1992).

Pollination: *V. thapsus* flowers are cross-pollinated by short and long tongued bees. Flowers are also autogamous, self-pollination occurring at the end of the day if cross-pollination has not occurred (Gross and Werner 1978).

Propagation: *Verbascum* species can be propagated from seeds, divisions, or root cuttings (Brickell and Zuk 1997).

Dispersal: *V. thapsus* plants are dispersed over long distances in horticulture trade. Seeds on established plants tend to fall nearby and secondary spread is usually not very far from parent plants. In Hawai'i, it has been speculated that seeds are dispersed in mud along roads by cars and along trails by hikers (Juvik and Juvik 1992, Stone and Pratt 1994).

Pests and diseases: Brickell and Zuk (1997) report that *V. thapsus* is susceptible to powdery mildew, a variety of fungal leaf spots, and caterpillars.

DISTRIBUTION

Native range: In their native range, *Verbascum* species are found mainly on dry, stony hillsides, wasteland, and open woodland in Europe, Africa and West and Central Asia (Brickell and Zuk 1997).

Global distribution: *V. thapsus* has become naturalized in North America and other temperate regions of the world, including Hawai'i, La Reunion, Australia, and New Zealand (Juvik and Juvik 1992, Stone and Pratt 1994). *V. thapsus* covers all of the United States and southern Canada (OSU 2003, PLANTS 2003). In states such as Ohio, *V. thapsus* is commonly abundant throughout the state occurring on roadsides railroads, fence rows, old fields, pastures, and agricultural fields (OSU 2003). *V. thapsus* was first introduced to North America as early as the 1700's to Virginia for use as a piscicide (fish poison). By the early 1800's, *V. thapsus* was so well established on the East Coast that it was erroneously described as native in 1818. By 1876, *V. thapsus* had spread across North America to the Pacific Coast (Brewer et al. 1876). In California *V. thapsus* occurs on The Nature Conservancy's Santa Cruz Island, Northern California Coast Range, and McCloud River Preserves (Hoshovsky 1986).

State of Hawai'i distribution: *V. thapsus* is established on the island of Hawai'i and has been sparingly found and controlled on the island of Maui. On Hawai'i, *V. thapsus* is most common on leeward uplands 3,940-9,840 ft (1,200-3,000 m) of Mauna Loa, Mauna

Kea, and Hualalai (Juvik and Juvik 1992). It occurs also occasionally occurs in areas outside these zones, including windward Mauna Loa and some coastal and arid western sites (Juvik and Juvik 1992).

Island of Maui distribution: On Maui, *V. thapsus* was first discovered in 1986 in Haleakala National Park at 9,150 ft (2,789 m) below Kalahaku lookout (Medeiros et al. 1999). It was found again in the Park in 1988 at 6,900 ft (2,103 m) below headquarters (Medeiros et al. 1999). Both plants were destroyed. Cultivated plants were then found in a Kula Nursery and were also destroyed. Recently, *V. thapsus* was observed being cultivated in Kula.

CONTROL METHODS

It is recommended that a combination of control efforts be used. Effective management of *V. thapsus* includes manual removal of plants before flowering, the establishment of a dense groundcover, and minimizing the availability of bare soil (Hoshovsky 1986).

Physical control: *V. thapsus* plants, especially seedlings, are easily hand pulled (Remaley 1998). Hand pulling does create disturbance and plants should be pulled prior to flowering if possible. Seeds should be bagged and thrown away.

Chemical control: Broadcast foliar herbicides are used in dense *V. thapsus* infestations where non-target effects are minimal (Hoshovsky 1986). It is also used in areas where access is limited, such as on steep slopes, or when hand pulling would cause too much disturbance (Remaley 1998). A 2% solution of glyphosate or triclopyr is suggested (Remaley 1998). Basal stem sprays are also effective.

Biological control: A curculionid weevil (*Gymnaetron tetrum*), specific to *V. thapsus*, was introduced as a biological control agent to North America from Europe before 1937. The larva mature in the seeds and can destroy up to 50% of the seeds (Hoshovsky 1986). A second agent is the mullein moth (*Cucullia verbasci*) which has been tested and is being considered for introduction to the United States (Remaley 1998). There are also numerous pathogens, including root rot and powdery mildew, that occur on *V. thapsus* in North America (Hoshovsky 1986).

Cultural control: Because *V. thapsus* is such a prolific seed setter and seeds have such long viability lives, an established population is extremely hard to eradicate (Remaley 1998/). On Maui, early detection, rapid control, and public education are crucial to keep *V. thapsus* from establishing on Maui. Establishing a cover after control is suggested to prevent germination of *V. thapsus*.

Noxious weed acts: *V. thapsus* is a declared noxious weed in Colorado and Hawai'i (PLANTS 2003). It is also a class C noxious weed in Washington (PLANTS 2003).

MANAGEMENT RECOMMENDATIONS

V. thapsus has long been cultivated as a medicinal herb. It has become weedy in temperate regions throughout the world where it has been introduced including the

United States, southern Canada, Hawai'i, La Reunion, Australia, and New Zealand. In Hawai'i, *V. thapsus* is a state noxious weed. It is well established on the island of Hawai'i. On Maui, it is not established, but has been previously detected in limited numbers and controlled. It was recently observed being cultivated in Kula and efforts are underway to control the plant. *V. thapsus* threatens pristine areas of Haleakala National Park's upper elevations and continued early detection and rapid control as well as public education will be crucial in preventing *V. thapsus* from establishing on Maui.

REFERENCES

- Abrams, L. 1951. *Illustrated Flora of the Pacific States*. Vol. III. Stanford University Press, Stanford, CA.
- Brickell, C. and J.D. Zuk. 1997. *The American Horticultural Society A-Z Encyclopedia of Garden Plants*. DK Publishing, Inc., NY.
- Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds: *Verbascum thapsus* and *V. blatteria*. *Can. J. Plant Science* 58: 401-413.
- Gross, K.L. and P.A. Werner. 1982. Colonizing abilities of "biennial" plant species in relation to ground cover: implications for their distributions in a successional sere. *Ecology* 63(4): 921-931.
- Juvik, J.O. and S.P. Juvik. 1992. Mullein (*Verbascum thapsus*): The Spread and Adaptation of a Temperate Weed in the Montane Tropics. In: *Alien Plant Invasions in Native Ecosystems of Hawai'i*, C.P. Stone, C.W. Smith, and J.T. Tunison, eds. University of Hawai'i Press, Honolulu, HI.
- Munz, P.A. and D.D. Keck. 1973. *A California Flora and Supplement*. University of California Press, Berkeley, CA.
- Hovshovsky, M.C. 1986. Element Stewardship Abstract for *Verbascum thapsus* (common mullein). The Nature Conservancy, Arlington, VA.
- Medeiros, A.C., L.L. Loope, and C.G. Chimera. 1999. *Flowering Plants and Gymnosperms of Haleakala National Park*. Coop. Natl. Park Resources Studies Unit, University of Hawaii, Manoa, Dept. of Botany. Tech. Rept.
- OSU (Ohio State University). 2003. Ohio Perennial & Biennial Weed Guide. Ohio State University, OH. Available: <http://www.oardc.ohio-state.edu/weedguide/> (Accessed: March 13, 2003).
- PLANTS (National Plants Database). 2003. Online database. United States Department of Agriculture, Natural Resources Conservation Services, National Plant Data Center, Baton Rouge, LA. Available: <http://plants.usda.gov> (Accessed: March 13, 2003).

Remaley, T. 1998. Common mullein (*Verbascum thapsus*). Plant Conservation Alliance, Alien Plant Working Group, National Park Service. Available: <http://www.nps.gov/plants/alien/fact/veth1.htm> (Accessed: March 13, 2003).

Stone, C.P. and L.W. Pratt. 1994. *Hawai'i's Plants and Animals: Biological Sketches of Hawaii Volcanoes National Park*. University of Hawaii Press, Honolulu, HI.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. *Manual of the Flowering Plants of Hawai'i*. 2 vols. Bishop Museum Special Publication 83, University of Hawai'i and Bishop Museum Press, Honolulu, HI.