Echium plantagineum L.

Vipers bugloss

Family: Boraginaceae
Range: Currently found only in Oregon and California.
Habitat: Open woodlands, pastures, and roadsides. It is drought-tolerant and very competitive on heavy soil, but can also be found on sandier soils.
Origin: Native to Mediterranean Europe and North Africa. Apparently escaped from cultivation as an ornamental.
Impacts: Vipers bugloss outcompetes pasture and grassland vegetation and quickly becomes the dominant species. It is toxic, producing a pyrrolozidine alkaloid that can cause chronic liver damage and death, especially in cattle and horses that graze the plant. It currently infests over 80 million acres of rangeland in Australia.
Western states listed as Noxious Weed: Oregon

Vipers bugloss is also referred to as Paterson's curse or salvation jane in Australia. It is a winter annual to biennial from 1 to 6 ft tall, depending on conditions. The leaves are sessile, alternate, rough-hairy, and 2 to 7 inches long. The blades are oval in outline with distinct mid- and lateral veins and often with wavy margins. The rosettes are 4 to 14 inches wide and flat on the ground. Plants bolt in spring, with multiple scorpioid or "fiddleneck" tipped hairy stems.

The stems bear sessile flowers near the tip of the scorpion-like inflorescence. Flowers are showy, pink to blue or purple, and about 1 inch long. The corolla is trumpet-shaped with five tips, with two of the five stamens extending beyond the petal tips. Blueweed, a closely related plant (*Echium vulgare*), bears flowers in which all five stamens extend beyond the petal tips. Each flower produces four dark brown or gray teardrop-shaped "nutlets", about ¼-inch long and covered with wart-like tubercles. Plants reproduce only by seed, which disperse primarily by falling to the ground below the parent plant. The seeds are hard-coated and survive ingestion by livestock. A small proportion of the seeds can remain dormant in the soil seedbank for up to 5 years or more.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Vipers bugloss spreads exclusively by seed, so hand weeding must be conducted before flowering and seed set to control the species. Hand pulling is generally not appropriate for large populations. Hand control is best employed when soil is moist and plants are still in the rosette stage. It is important to remove the entire root system, or the plant will resprout. Mowing will not generally kill the plants, and may even be counterproductive, as this plant is often found in pastures and rangelands where too-frequent mowing will harm forage grasses.
Cultural	Grazing can be a contributing factor to the spread of vipers bugloss, since this plant invades overgrazed or poorly managed pastures and rangelands. In fact, the number of vipers bugloss seedlings was shown to decrease in the absence of grazing. Therefore, maintaining forage lands in a healthy, competitive state will deter establishment of vipers bugloss. In Australia, limiting grazing intensity in the autumn helps to improve forage competitiveness at the time when vipers bugloss seeds are germinating. Grazing the weed itself is not recommended as a management tool because vipers bugloss is toxic to cattle and horses, containing a similar alkaloid to that found in tansy ragwort (*Senecio jacobaea*).
Biological	There are no known biological control agents to control vipers bugloss in the United States. However, in Australia, six agents have been released. This biological control program became a landmark case in the history of weed biological control because conflicts occurred between ranchers and beekeepers (honey is

	produced from vipers bugloss). This led to a full public enquiry, and a cost: benefit analysis strongly favored controlling the plant and led to the first biological control legislation in Australia. Since then the impacts of two of the agents (*Mogulones larvatus* and *Longitarsus echii*) have been significant and sufficient for detailed economic evaluation of the project, which projected saving Australian agriculture nearly $1 billion by 2050.

CHEMICAL CONTROL

The following specific use information is based on reports by researchers and land managers. Herbicides listed below have been shown to be useful against closely the related weed species blueweed (*Echium vulgare*) and small bugloss (*Anchusa arvensis*). Other trade names may be available, and other compounds may also be labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

GROWTH REGULATORS	
2,-4-D Several names	**Rate:** 2.1 qt product/acre (2 lb a.e./acre) **Timing:** Postemergence. Spring is best to control seedlings, but treatments can be made in mid-summer to autumn for established plants. **Remarks:** 2,4-D is a broadleaf herbicide that, when used alone, is usually not adequate to completely control annual borage species. It is most often used in combination or sequence with other herbicides such as picloram. Picloram, however, is not registered for use in California. Use with 0.25% v/v non-ionic surfactant to improve control.
Picloram *Tordon 22K*	**Rate:** 1 to 2 pt product/acre (4 to 8 oz a.e./acre) **Timing:** Preemergence or postemergence. Treatment in autumn should provide control through spring. **Remarks:** Follow up treatment with other product may be necessary to control late-germinating seedlings. Use with 0.25% v/v non-ionic surfactant to improve postemergence control. Picloram is a restricted use herbicide. Picloram is not registered for use in California.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Accord XRT II*, and others	**Rate:** Broadcast treatment: 6 to 22 oz product (*Roundup ProMax*)/acre (0.21 to 0.77 lb a.e./acre). Spot treatment: 1 to 2% v/v solution. Wiper treatment: 33 to 50% of concentrated product. **Timing:** Postemergence. Broadcast applications should be applied from late spring to mid-summer to kill vipers bugloss before seeding. **Remarks:** It may be necessary to make follow-up application in subsequent years to control germinating seedlings. Glyphosate can also injure forage grasses, so this product is best applied for control of pure stands or on otherwise bare ground (such as along roadsides). Use with 0.25% v/v non-ionic surfactant to improve control. Wiper applications to bolted plants have been helpful to control the plant in Australia, but application should be made when weeds are taller than forage grasses.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Metsulfuron *Escort*	**Rate:** 1 to 2 oz product/acre (0.6 to 1.2 oz a.i./acre) **Timing:** Postemergence. Spring is best to control seedlings, but treatments can be made in mid-summer to autumn for established plants. **Remarks:** Repeat applications will likely be necessary. Use with 0.25% v/v non-ionic surfactant for optimum control. Resistance to sulfonylurea herbicides (metsulfuron and chlorsulfuron (*Telar*)) has been documented for vipers bugloss in Australia. Tank mixtures or sequential treatments with herbicides of other modes of action is recommended to delay onset of resistance. Metsulfuron is not registered for use in California.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.