Arundo donax L.

Giant reed

Family: Poaceae
Range: Southern region of the U.S. In the west it can be found in California, Nevada, Utah, Arizona, New Mexico, and Texas.
Habitat: Riparian areas, floodplains, ditches, typically on sites with a low slope. Occurs in a wide range of soil types, but grows best in well-drained moist soils. Tolerates some salinity and extended periods of drought. Does not survive in areas with prolonged or regular periods of freezing temperatures.
Origin: Native to the Mediterranean region and tropical Asia. In California from the late 1700s to early 1800s, giant reed was often planted for erosion control in flood channels and as wind breaks. Since then it has been cultivated as an ornamental and to produce reeds for woodwind instruments. It is now a leading candidate for cellulosic biofuel production.
Impacts: Giant reed is primarily a problem in riparian corridors. It develops dense stands which often displace native vegetation, diminish wildlife habitat, and increase flooding and siltation in natural areas. Giant reed is also adapted to a periodic fire regime. The canes are readily flammable throughout much of the year, and the presence of giant reed increases the susceptibility of riparian corridors to fire. Large stands of giant reed can increase water loss from underground aquifers in semi-arid regions due to a high evapotranspiration rate. The rate of water loss is estimated at roughly three times more than that of the native riparian vegetation. It is also an alternate host for beet western yellows virus, sugarcane mosaic virus, and maize dwarf mosaic virus.
Western states listed as Noxious Weed: California
California Invasive Plant Council (Cal-IPC) Inventory: High Invasiveness

Giant reed is a bamboo-like perennial to 25 ft tall, with thick, well-developed rhizomes. Although plants are typically terrestrial, they can tolerate periodic flooding. The canes are erect, semi-woody, and about 1 to 2 inches thick. First year green canes have unbranched stems the same diameter as older canes, but more pliable. Older canes are often branched, sometimes with leaves only on the branches. The blades are less than 3 ft long and 1 to 3 inches wide. The ligules consist of a short, even, minutely fringed membrane about 1 to 2 mm long. The auricles and collar region are distinctly pale yellowish-green. The rhizomes are creeping, thick, scaly, often forming a dense network, firm and knotty at the stem bases. Rhizome and stem fragments with a node can develop into a new plant under suitable conditions.

Inflorescences consist of large terminal plume-like panicles, 1 to 2 ft long, and silvery cream-colored to purplish or brown. Giant reed does not appear to produce viable seed in North America, although some Asian populations produce viable seed. Plants reproduce only vegetatively from rhizomes and rhizome and stem fragments; and stem and rhizome fragments generally disperse with water, mud, and human activities.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Minor infestations can be eradicated by manual methods, especially where sensitive native plants and wildlife might be damaged by other methods. Plants less than 6 ft in height and arising from a new stem or rhizome fragment can be hand pulled. This may be most effective in loose soils and after rains have loosened the substrate. Giant reed can also be dug using hand tools, particularly when used in combination with cutting near the base of the plant. Chopping, cutting or mowing (rotary brush cutter, chainsaw, or tractor-mounted mower) can also be used to reduce giant reed infestations, although the fibrous nature of giant reed makes using these techniques difficult. Such methods usually require tractor-mounted equipment, but on rough or rocky soils scythes can be used for smaller patches. These methods generally cause less soil disturbance compared to heavy

	equipment. However, they are nonselective and may damage other desirable species or open up new niches for weedy invasions. These methods usually require several cuttings before the underground parts exhaust their reserve food supply, and larger giant reed patches will have enough reserves to resprout even after years of treatment. The best timing for cutting is when the plants begin to flower, as this is when the reserve energy supply in the rhizomes is lowest. Mechanical methods using mechanized equipment (e.g., backhoe) to remove above-ground vegetation is a common non-chemical control method for giant reed. However, such equipment is also nonselective and can only be used on accessible terrain. Most mechanical equipment is not safe to operate on slopes over 30%. It is also of limited use where soils are highly susceptible to compaction or erosion or where excessive soil moisture is present. Site obstacles such as rocks, stumps or logs also reduce efficiency. Mechanical eradication of giant reed is extremely difficult, even with the use of a backhoe, as rhizomes buried under 3 to 10 ft of alluvium readily resprout. Regardless of the mechanical removal method employed, it is critical to remove the entire rhizome root mass. If any of the rhizome mass is left in the ground it will resprout. In addition, stems and roots should be removed, chipped or burned on site to prevent resprouting.
Cultural	Giant reed is not very palatable to cattle, but they will feed on it during the drier months. Sheep also have potential for the management of giant reed and have been shown to survive for extended periods on a strict diet of the perennial grass. However, sheep must be properly managed to prevent soil compaction problems particularly in wet areas. The most successful grazers are goats, particularly Angora and Spanish goats. Goats can have several advantages over mechanical and chemical control methods; they are less costly and can negotiate slopes too steep to manage with machines. Angoras are preferred over Spanish goats because of their smaller size and ease of transport. Since goats will trample or browse virtually any vegetation within a fenced area, any desirable trees or shrubs must be protected. A flame thrower or weed burner device can be used as a spot treatment to heat-girdle the stems at the base of giant reed plants. This technique is less costly than basal and stem herbicide treatments and is suitable for use during wet weather when the wildfire hazard is low. Its effectiveness is comparable to manual cutting. Large infestations may be burned to remove standing mature plants. This may be accomplished with or without a pre-spray of herbicides to kill and desiccate plants. When burning is used alone it will not prevent resprouting from the rhizomes. Burning is best followed by herbicide treatment of resprouting plants.
Biological	Little is known about the effects of various pathogens and insects on the growth and reproduction of *Arundo donax*. However, numerous insects are known to feed on this species. In recent work, the eurytomid wasp, *Tetramesa romana*, was evaluated as a potential biological control agent in North America. The wasp was found to be specific to *Arundo* and thus unlikely to harm native or cultivated plants in the Americas. Undoubtedly, many more years will be required before this species or any other potential biological control agents are identified and released.

CHEMICAL CONTROL

The following specific use information is based on reports by researchers and land managers. Other trade names may be available, and other compounds also are 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.

AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Accord XRT II*, *Rodeo*, *Aquamaster*, and others	**Rate:** Broadcast foliar treatment: 2 to 4 qt product (*Roundup ProMax*)/acre (2.25 to 4.5 lb a.e./acre) or 2 to 4 qt product (*Rodeo* or *Aquamaster*)/acre (2 to 4 lb a.e./acre) around aquatic sites. Spot treatment: 2% v/v solution. However, the *Rodeo* product label allows up to an 8% v/v solution, depending on the equipment being used. **Timing:** Postemergence. Mid-summer to fall application after flowering and before dormancy is the best timing to kill plants and protect injury on many natives. Follow-up application in subsequent spring to control germinating seedlings may be necessary. **Remarks:** Glyphosate is considered the best option for control in pure stands. Two to three years of treatment are necessary. Herbicide treatment can be used after repeated mowing to reduce necessity for spring treatment to kill seedlings. Dense stands of giant reed (> 80% canopy cover) are most efficiently treated by aerial application, usually by helicopter. Helicopter application can treat at least 124 acres per day.

	Undiluted glyphosate can be applied as a cut stump treatment with a paint brush within 1 to 2 minutes after stem cutting. Results have shown that glyphosate used in a cut stem treatments, regardless of time of application (May, July, or September), provided excellent control with no resprouting. Another method of treatment includes cutting or burning plants followed by foliar treatment of glyphosate to cane regrowth to about 6 to 8 ft in height.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat*	**Rate:** 1 to 2 qt product/acre (0.5 to 1 lb a.e./acre) **Timing:** Postemergence fall application timing is most effective, similar to glyphosate. **Remarks:** Imazapyr has soil residual activity and may impact restoration efforts.
Imazapyr + glyphosate	**Rate:** 1 pt imazapyr (*Habitat*) + 1 qt glyphosate product/ acre (0.25 + 1 lb a.e./acre, respectively) **Timing:** Postemergence fall application timing is most effective. **Remarks:** The combination of the two herbicides prevents the synthesis of six amino acids, as each herbicide inhibits three amino acids. This combination is thought to provide better control at lower rates of each herbicide, thus it is more affordable compared to imazapyr alone.

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.