

# Fireweed

(*Senecio madagascariensis*)

An Alien Plant Report

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In cooperation with:  
American Water Works Association Research Foundation  
Maui County Board of Water Supply

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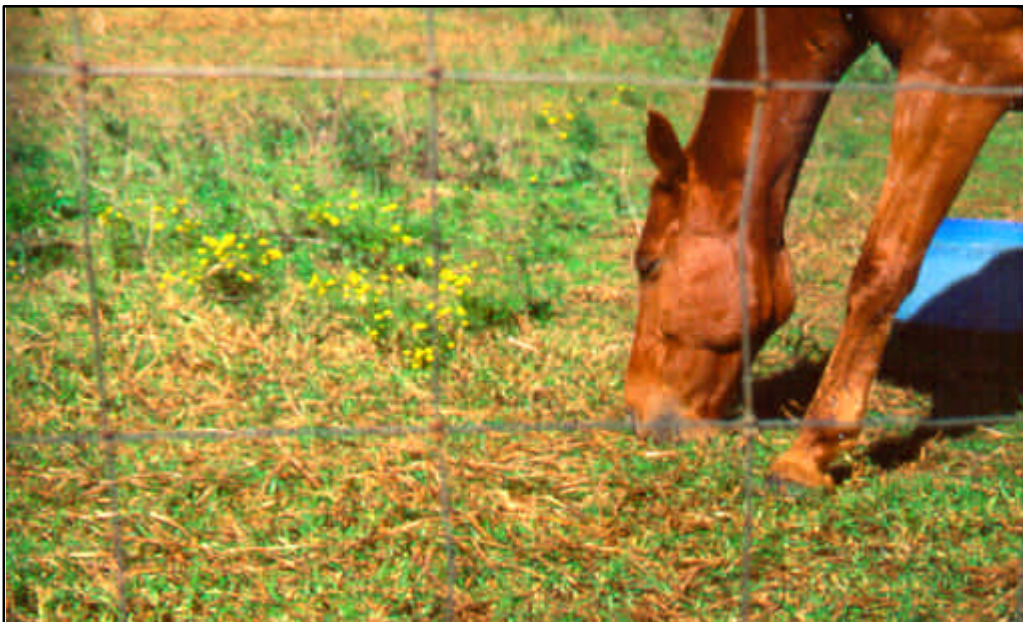
## **What is Fireweed? Why is it bad?**

Fireweed is a pretty yet poisonous yellow flowered weed that is often found in paddocks, pastures, and roadsides. It can be identified by its yellow 13 petal-like rays. This plant is poisonous to horses, cattle, and other livestock. It is often responsible for ill-thrift and poor performance and can, in extreme cases, kill some animals. Symptoms of poisoning from fireweed include gradual weight loss, jaundice, fluid in the lungs, blindness, sudden death without any other indications, aimless wandering, muscular coordination, twitching of the head muscles, abdominal straining, rectal prolapse, and irritability. Originally from Africa, fireweed was first discovered in the early 1980's by Parker Ranch staff on the Big Island. Since then, fireweed has spread quickly and is now found on Maui and Kaua'i. Fireweed is currently common in Pukalani and Kokomo.



## **What should you do if you see this plant?**

1. Call the Hawai'i Ecosystems At Risk (HEAR) project at 572-4418, or the State Department of Agriculture (DOA) at 873-3555.
2. Pull out the plant and put in bag if possible.
3. For more information, or additional copies of this flyer, call 572-4418, websurf to [www.hear.org](http://www.hear.org), or talk to your local cooperative extension agent.



Horse in fireweed infested pasture, Makawao, Maui



United States Geological Survey  
Biological Resources Division



Maui County  
Board of Water Supply



Youth for  
Environmental Services



American Water Works Association  
Research Foundation

# Fireweed

## (*Senecio madagascariensis*)

**Overview:** Fireweed has become a serious pest plant in Hawai'i and Australia. Fireweed appears to be a harmless and pretty plant at first sight; however, it is poisonous when ingested by livestock causing a characteristic type of liver damage. Symptoms of poisoning from fireweed include gradual weight loss, jaundice, fluid in the lungs, blindness, sudden death without any other indications, aimless wandering, muscular coordination, twitching of the head muscles, abdominal straining, rectal prolapse, and irritability. Fireweed has been ranked as the worst weed by 43% of dairy, beef, and horse producers in New South Wales, Australia (DRDC 1996). In Hawai'i, fireweed is also becoming a serious pest where it is spreading quickly on the wind, carried by animals and humans, as a contaminant in hydromulch, and on equipment. Fireweed is prolific and may be just beginning to invade its potential range in the Hawaiian islands. There is still the potential for eradication of fireweed on Maui, but that window of opportunity is rapidly closing.

**Potential for public involvement:** Fireweed threatens a broad range of people. Its poisonous qualities and impacts to economy and lifestyle have been well documented in Australia. Currently, on Maui, most managers of large ranches and the Department of Agriculture are aware of fireweed's presence, but no formal plan of attack exists. There is also a lack of awareness among small farm owners, horse owners, and the general public. Many horses can be seen wandering around infested pastures whose owners are unaware of the plant's toxicity. Because fireweed occurs on many different properties, with many different land uses, awareness by all individuals in infested areas will lead to better and swifter overall control. Information dissemination such as mailings of one-page flyers to residents in infested areas, video productions on public access television, and word of mouth can assist in disseminating information to the public. The Cattlemen's Association is beginning to include fireweed in their discussion at meetings. A fireweed service trip has been scheduled by Youth for Environmental Services. High school students could pass out one-page flyers in neighborhoods of residential Kokomo and Pukalani to help spread the word. Another opportunity would be to include fireweed control along the Pukalani bypass during community work days. Currently, volunteers walk down the highway, picking up trash. This area is also heavily infested with fireweed. Volunteers could remove fireweed plants in a similar manner that the trash is removed.

**Common name:** Fireweed, variable groundsel

**Latin name:** *Senecio madagascariensis* Poiret

**Taxonomy:** In the Asteraceae (Sunflower) family, *Senecio* is the largest and most diverse genus of all flowering plants represented by more than 1,500 species of annuals, biennials, herbaceous perennials, climbers, shrubs, and small trees, some of them

succulent. *Senecio* can be found occurring throughout the world (Brickell 1997). The genus can be divided into modally distinct groups that have often been recognized as segregate genera. The introduced species in Hawai'i fall into *Senecio* sensu stricto. Name derived from Latin senex (old man) in reference to the white pappus (Wagner et al. 1990). Other *Senecio* in the state of Hawai'i and on Maui include: Dusty miller (*S. cineraria*), a common bedding plant with felted, silvery gray leaves., Mexican flame vine (*S. confusus*), a cultivated ornamental vine with orange to reddish orange rays that escapes cultivation into adjacent areas, German Ivy (*S. mikanioides*=*Delairea odorata*), a widely cultivated ornamental vine with yellow flowers that is becoming a serious pest on Mauna Kea and East Maui, wood groundsel (*S. sylvaticus*), and common groundsel (*S. vulgaris*) (Wagner et al. 1990).

**Description:** Fireweed is a low, upright, branched, herbaceous, mid-green plant with golden yellow flowers. Fireweed has a variable growth habit and leaf structure, growing from 10-50 cm tall (Watson et al. 1997). Typically, leaves are bright green, alternate, narrow with serrated, entire or lobed margins. The broader leaves are usually clasped around the stem and are 2-6 cm long, sometimes reaching 8-10 cm in older, more vigorous plants (Watson et al. 1997). Fireweed flowers profusely (Motooka et al. 1996) producing 2-200 flowers per plant. The small, daisy-like flowers are 1 to 2 cm in diameter appearing at tips of branches. Both the petals and the central disk of the flower are golden yellow, and each flower usually has 13 petals. The flowers mature into white thistle balls. Seeds are small (about 1-3 mm long), light, and slender, each with a pappus of silky hairs (Watson et al. 1997). Each plant has a shallow, branched, tap root which grows from 10-20 cm deep (Watson et al. 1997).

**Value to humans:** No references of fireweed being used by humans has been found. However, it is possible that the plant could be grown for ornament with its pretty, yellow, daisy like flowers.

**Noxious Weed Acts:** Fireweed is on the Hawai'i Department of Agriculture's State Noxious Weed List, 1992. In Australia, fireweed is a declared noxious weed in 14 coastal local government areas.

**Problems:** Fireweed is toxic to herbivores (plant eaters). It is often responsible for ill-thrift and poor performance of cattle and can, in extreme cases, kill some animals (Watson et al. 1997). This is because it contains pyrrolizidine alkaloids which are toxic. These chemicals produce a characteristic type of liver damage. Symptoms of poisoning from fireweed include gradual weight loss, jaundice, fluid in the lungs, blindness may occur, sudden death without any other indications, aimless wandering, muscular coordination, twitching of the head muscles, abdominal straining, rectal prolapse, and irritability (Anon. 1997; Watson et al. 1997). All growth stages of the plant are toxic (Watson 1997). Fireweed is poisonous whether it is green or dry. Hay or silage contaminated with fireweed will also be poisonous.

Fireweed is an invasive plant that rapidly colonizes heavily grazed or neglected pastures, and cultivated, or disturbed, land during the autumn to spring period. It competes

strongly with other useful pasture plants for light, water, and nutrients leading to further degradation of the invaded pasture and grazing area (Watson et al. 1997). Fireweed takes advantage of drought to further spread itself (DRDC 1996). In Australia, fireweed has caused significant losses to pasture production during some spring periods. The combined herbicide use and toxic effects on cattle may amount to \$11 million in non-drought years (DRDC 1996). It is also estimated that fireweed may reduce pasture production on as many as 16% of paddocks on the New South Wales coast in some years (DRDC 1996).

Horses and cattle are most susceptible to poisoning from ingestion of fireweed. Young hungry stock are in the highest risk category (Watson et al. 1997). Poultry have also been affected. Sheep and goats are less susceptible but may become affected after multiple seasons of exposure (Anon 1997). Symptoms are most often seen in young cattle (Watson 1997). Horses will vary in their susceptibility, taking from several weeks to several seasons of exposure before showing signs of illness. However, some horses may have a more acute reaction (Anon. 1997).

Fireweed is generally unpalatable to cattle and horses. Toxic levels may not reach a critical level if grazing of fireweed is not continuous and sustained (Watson et al. 1997). However, under certain circumstances, fireweed is difficult to avoid. These include areas where there is a severe shortage of other feed and fireweed is the only food left, where a pasture is so heavily infested with young fireweed plants that they can not be avoided, and where a paddock with a thick stand of fireweed is slashed or mowed then grazed by stock immediately after (Watson et al. 1997).

**Native Range:** Fireweed is native to Madagascar and South Africa (Motooka et al. 1996). In southern Africa fireweed is believed to occur up to 4,921 ft (1500 m) (Hilliard 1977).

**Range of Invasion:** Fireweed, with its wind dispersed seeds, has already become naturalized in Australia and New Zealand and has the potential of becoming a serious weed in the Hawaiian Islands (Lorence and Flynn 1995). Fireweed readily invades pastures damaged by overgrazing, drought, or (in Hawai'i) the yellow sugarcane aphid (Motooka et al. 1996). Fireweed can be found from low-elevation arid pastures and coastal plains to higher-elevation, moist pastures, yards, fields and roadsides. Fireweed has been reported as a pest to pastures in Hawai'i and in Australia. In Hawai'i, fireweed is invading on Maui, the Big Island, and Kaua'i. Fireweed occurs at high altitudes 2,600 m (8,530 ft) to 2,800 m (9,186 ft) in tropical environments in Kenya and Columbia (Sindel and Michael 1992).

On Maui, fireweed can be found primarily in upcountry east Maui. The area of highest density is in Pukalani and Makawao, at an elevation of 1,600 ft (488 m). Dense stands of fireweed can be seen along the Pukalani bypass and in paddocks in the Makani area of Makawao. A smaller infestation can be found in the Kokomo area at an elevation of 1,400 ft (427 m), and scattered individuals have been found in Ulupalakua, Kula, Olinda, Waikamoi, Ha'iku, Kahului, and near Kihei. Fireweed has been found on Maui from near

sea level (Kahului) up to elevations of 4,400 ft (1,341 m) (Crater Rd. and Waikamoi). It has been found in areas with rainfall ranging from over 100 inches per year (Waikamoi) to areas with less than 20 inches per year (near Kihei). It has been found invading pastures, yards, roadsides, abandoned fields, and newly developed lots. New locations of fireweed have been found this past year at an alarming rate. Outlier plants, if not controlled, quickly multiply and spread.

On the Big Island, fireweed is spreading fast and is increasingly becoming a management concern for ranchers. It was first discovered in the early 1980's (Motooka et al. 1996) when Parker Ranch staff noticed it in their pastures near Hawi. Within a decade that pasture was infested all the way up to Kahua Ranch. In May 1995, a plant was found and destroyed one mile north of Puuanuhulu, miles from the nearest known infestation. Since then, it has been reported on Kahuku Ranch in Kau (Motooka et al. 1996).

On Kaua'i, fireweed was first collected in 1990 on highway 50 along newly seeded road cut over Huleia Stream (Halfway Bridge) at an elevation of 318 ft (97 m) (Lorence et al. 1995). Because the infestation was found on a hydromulched roadcut on Halfway Bridge, at it was surmised that the groundcover seed from Australia was contaminated with fireweed (Motooka et al. 1996). So far, this is the only known incident of fireweed on Kaua'i, and because of diligent control and follow up by the Department of Agriculture, fireweed is thought to be eradicated there (Motooka 1996).

In Australia, fireweed was introduced around 1919 (DRDC 1996) and is now a serious weed of coastal pastures in New South Wales (Watson et al. 1997). It is especially abundant in the Richmond, Manning and Hunter Valleys, in the Sydney metropolitan area, and between Wollongong and Berry on the South Coast. Fireweed has spread as far south as Bega and is known to occur in south-eastern Queensland. It has also been shown that fireweed can occur on the Northern and Southern Tablelands (Watson et al. 1997). It is usually found in heavily grazed pastureland and may spread into bushland after fires (Anon. 1997). It has been found in shires around Brisbane and as far north as Noosa where it is spreading along the Bruce Highway and the Sunshine Motorway (Anon. 1997). At Dubbo, Australia, where the climate is much drier compared to coastal areas of south-eastern Australia, fireweed is thriving around water holes and in irrigated areas (Sindel and Michael 1992). Fireweed is unlikely to invade undisturbed native vegetation, because of strong competition, shading and the lack of soil disturbance (Sindel and Michael 1992).

**Climate where invading:** Fireweed readily invades pastures, roadsides, and lawns, especially those damaged by overgrazing, drought, or insects like the yellow sugarcane aphid (*Sipha* sp.) (Motooka et al. 1996). Fireweed grows in a wide range of soils from high fertility, self-mulching clay soils to low fertility, acid sandy soils. It will not survive in poorly drained or waterlogged situations (Watson et al. 1997). Fireweed seems equally at home in low-elevation, arid pastures as in higher-elevation, moist pastures. In Hawai'i, on Maui, fireweed is known from sea level to 4,400 ft (1,341 m) in dry and moist situations. Fireweed does not do well in pastures with weeds taller than 3 ft (1 m). It has been found in both shade and full sun. Climate profiles for fireweed based on 120

established localities alone showed that fireweed occupied areas in Australia with annual mean precipitation of 27 in min. to 94 in max. (Sindel and Michael 1992). Frost in cooler highland areas of Australia may contribute to seedling mortality and reduced plant vigor (Sindel and Michael 1992). In the Southern hemisphere, infestations of fireweed occur predominantly in areas with "mesothermal" climate (Kippen 1936).

**Biology and ecology:** Fireweed is highly adaptable to changes in the environment. Under normal or favorable seasonal condition, the plant can behave as a short-lived perennial. In an extremely dry season or in an arid environment, it behaves as an annual (Watson et al. 1997).

In Australia, flowering occurs usually from April through September, with various stages of flower production at any one time. In Hawai'i, plants can be seen flowering and seeding year round. Flowers are numerous, up to 200 per plant. Each flower may produce 100-150 seeds. Therefore, Each plant has the ability to produce 25,000-30,000 seeds. Seeds are light and slender and are highly viable. Germination rates of 90% were attained in Australia (Watson et al. 1997). Germination of seeds is stimulated by rainfall and sometimes by mild, warm temperatures. Optimum temperature for germination is 15-27 degrees Celsius with most rapid germination between 20-25 degrees Celsius. Most seeds germinate over the year, but greatest germination occurs from March to June (Watson et al. 1997). Plants can produce flowers 6-10 weeks after emergence. Seeds can germinate as soon as they leave the parent plant. Seeds are thought to remain viable for up to several years (Watson et al. 1997).

Dispersal of large amounts of seed by wind is considered to be the major factor responsible for the weed's rapid spread over large areas and long distances. Fireweed also can be spread in hay and grain products, hydromulch, on clothing and vehicles, on equipment such as mowers, and on birds and other animals.

**Control:** There is no one way of eliminating fireweed. An integrated approach which employs many weed management strategies listed here, prevention, and follow up will work best. Any effective control program needs to be thorough and systematic. Whichever control methods are selected it is vital that they occur before flowering to reduce seed production.

Prevention and early detection: For islands or areas free of fireweed, prevention is best. Historically, fireweed has been introduced on contaminated equipment, in hydromulch, or on humans or animals. If equipment, animals, or humans are being transported from an area infested with fireweed, clean items before transporting to reduce the potential of fireweed introduction. On Kaua'i, fireweed was found and controlled when it was initially introduced as contaminate in hydromulch. This prevented a major infestation. Diligent follow up by the Department of Agriculture seems to have eradicated it from the island (Motooka et al. 1996). It is not known if the Maui population was introduced in the same manner or whether eradication for the island is feasible at this time.

**Mechanical control:** For sites with isolated plants, hand pulling before seed set will help prevent fireweed infestation. Seeds are wind dispersed, so if the site is surrounded by fireweed, reinvasion will occur. Neighborly pressure for others to remove fireweed from the area may help decrease the overall number of seeds set. After pulling up plants, they should be bagged and disposed of properly. Do not leave pulled up plants on the ground as they can reroot and grow vegetatively or continue to produce seeds (Watson et al. 1997).

**Cultural control:** Good pasture management is another way to combat infestations of fireweed. Practices such as sowing suitable competitive pasture species, controlled grazing, and timely application of fertilizers will help reduce the risk of fireweed invasion. Maintaining soils fertility and correcting soil problems such as acidity are important in establishing and maintaining a permanent competitive pasture. Soil phosphorus levels are one of the most important aspects of maintaining a vigorous pasture (Watson et al. 1997). Careful grazing management to maintain pasture density and a moderate body of pasture litter, will reduce fireweed seed germination and suppress fireweed seedling growth and development (Watson et al. 1997). Where pasture vigor declines because of drought or over-grazing, a reinfestation of fireweed is likely. Local agronomists can provide specific advice for fertilizer recommendations and pasture establishment techniques in you area.

**Slashing and mulching:** Slashing or mulching a fireweed paddock from mid-September onwards, before seed set, has proven effective on the Central Coast of Australia in paspalum/kikuyu paddocks (Watson et al. 1997). A danger of slashed or mulched fireweed is that it wilts and can become more attractive to stock, with a greater concentration of plant toxin. Slashing is therefore less desirable than mulching as it leaves a window which stock can readily graze (Watson et al. 1997). After slashing or mulching, fireweed infested paddocks should not be grazed for at least two weeks.

**Grazing:** Paddocks which are grazed with sheep or goats are usually relatively free of fireweed. Sheep and goats are about 20 times more tolerant to fireweed poisoning than horse and cattle (Watson et al. 1997). They can help reduce a fireweed infestation by eating seedlings and plants before they set seed. The animals will need to be occasionally rotated out of the fireweed paddocks, no more than two seasons is suggested (Watson et al. 1997). In the Gippsland area of Victoria, many dairy farmers carry some sheep for the sole purpose of controlling ragwort (*Senecio jacobaea*), a weed very closely related to fireweed (Watson et al. 1997). Problems with this control method do exist, however. Parasites, such as ticks, in the area may increase. Also, fireweed may not be completely removed. Many different methods need to be used together to successfully combat fireweed invasions.

**Chemical:** There are many chemicals which work effectively on fireweed including 2,4-D, dicamba, triclopyr, and glyphosate (Motooka et al. 1996). Tests in Hawai'i indicate that the amine salt formulation of 2,4-D would be preferable because of its low cost and mild effect on white clover (Motooka et al. 1996). Spray fireweed plants with registered herbicides during the small seedling-early flowering stages of growth. It is crucial to

spray plants when they are small to prevent seed set and usually lower rates of herbicide can be used. Isolated plants which survive can be pulled out by hand or resprayed. As with other methods, follow up treatment is necessary. Weed wiping equipment has also given good results (Watson et al. 1997).

**Biological Control:** Many naturally occurring diseases and insects have been found attacking, and sometimes destroying, fireweed plants in Australia (Watson et al. 1997). These include crysomelid beetles, magpie moths, a rust, stem mining and leaf mining flies, gall forming flies, and seed head feeding bugs. Other diseases cause the plant to blister. Biological control of fireweed using introduced insects from Madagascar has been attempted but because Australia has a native *Senecio*, it is unlikely that many of these will be released (Watson et al. 1997). There is a possibility that researchers in Hawai'i may get the opportunity to conduct field tests of one or more of these biocontrol agents (Motooka et al. 1997).

**Management recommendations:** In Hawai'i, fireweed is spreading rapidly on the Big Island and Maui. It has been thought to be eradicated on Kaua'i. On Maui, fireweed exists on many different lots with different land uses. Not everyone knows about the plant or the fact it is poisonous. Future efforts on Maui should focus on spreading the word about the harmful effects of fireweed. This can be done through many media including flyers, radio, television, and word of mouth. Control needs to happen not only in pastures, but in residential areas, along roadsides, and wherever fireweed turns up. Fireweed is a State noxious weed and is targeted for control by the Department of Agriculture; however, the battle needs to be led by the community. Because of fireweed's prolific seed set, removing fireweed from one pasture surrounded by an infested residential areas does not help, since there will always be reinvasion. However a community wide control program will reduce the number of mature plants, thereby reducing reinvasion.

Learning from the Kaua'i eradication, equipment or hydromulch moving from a fireweed infested area should be cleaned or restricted to those areas. Newly hydromulched and developed areas should be monitored before and after mulching occurs. This will allow easier detection of unwanted weeds introduced as contaminants. The harmful effects of fireweed should be shared with others and places still free of fireweed should be made aware of the plant and how it is spread to prevent further introductions. This plant threatens the lifestyle of ranching on Maui. It will take many resources and a swift and diligent plan of attack to prevent future spread.

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## Hand pulling of fireweed



Fireweed can often be found just off the side of the road, in pastures, and in lawns. It can be distinguished by its yellow flowers with 13 petal-like rays.



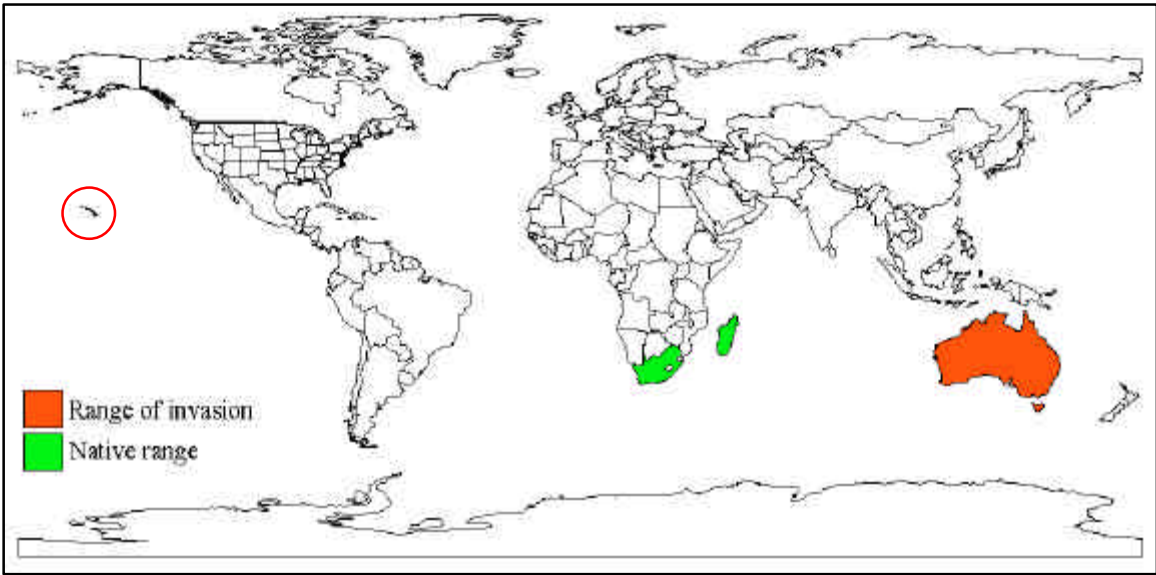
Fireweed can be easily pulled up. Grip the plant by its base, close to the ground. Pull the plant up, taking care to not scatter too many seeds. If the plant is small enough, the bag can be placed over the plant before it is pulled to better prevent spread of seeds.



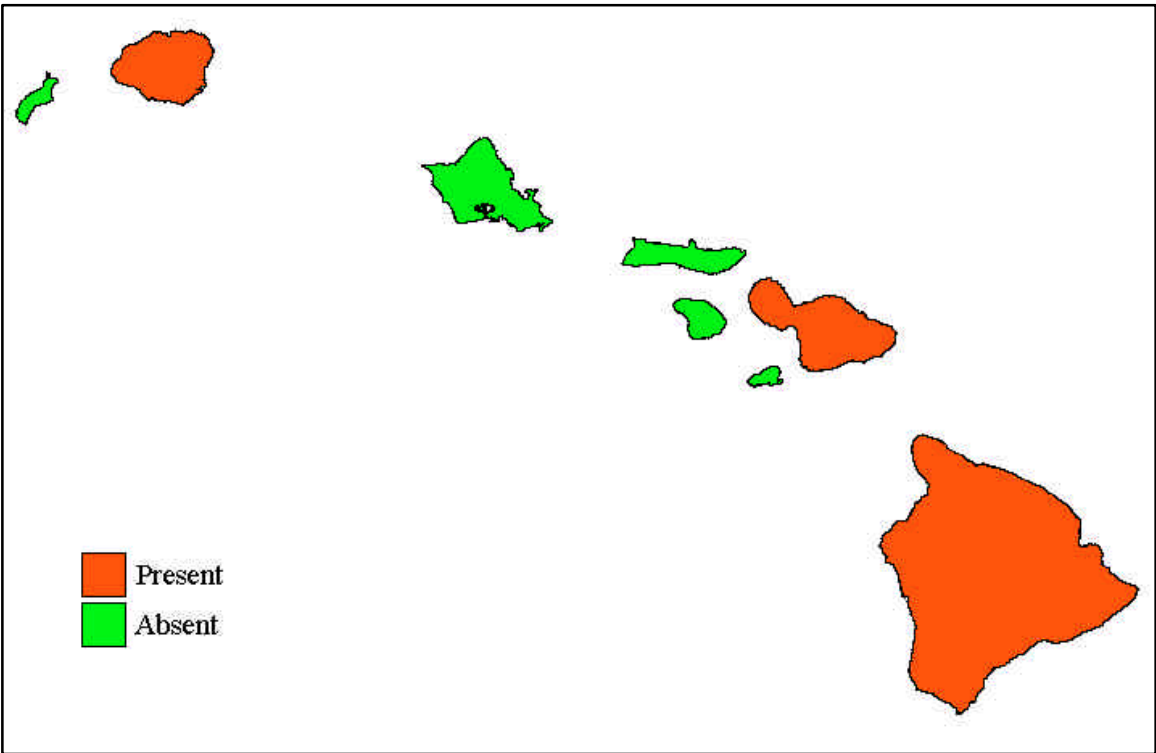
Place the fireweed inside a garbage bag. Double or triple bags may be necessary to securely contain the plant.



Follow up for seedlings will be required, but a little action now can go a long way to preventing another infestation of fireweed on Maui.



Known global distribution of fireweed



Known distribution of fireweed in the state of Hawai'i, USA

# Known distribution of fireweed (*Senecio madagascariensis*) on Maui

