

**WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
(Updated December 2000)**

Scientific Name: *Ulex europaeus* L.

Common Name: gorse

Family: Fabaceae

Legal Status: Class B, designated for control in regions:

- (a) 3,4,6,7,9,10
- (b) Skagit and Whatcom Counties of region 2
- (c) Thurston, Pierce and King Counties of region 5
- (d) Wahkiakum, Cowlitz and Lewis Counties of region 8
- (e) Clallam County of region 1

Description and Variation: Gorse is a perennial, evergreen shrub ranging from 3 feet to over 10 feet tall. Seedlings are compact, with trifoliate leaves and thin expanded leaflets typical of legumes. With plant maturity, the leaves develop an awl-shape (spinelike). Well-developed branch spines also grow in the leaf axils. Overall, gorse plants are shrubby with stout and erect spreading branches with angular stems and a terminal thorn. Branches mature from green to brown. The plant habit is dense, sometimes 30 feet in diameter with a center of dead foliage. The shiny yellow, pea-like flowers are ½ to ¾ inch long, with an ovate banner (upper petal), oblong wings (lateral petals) and keel (lower, united petals). The wings are larger than the keel. The calyx is pubescent and deeply two-lipped. The upper lip is 2-toothed and the lower lip is 3-toothed. The ten stamens are monadelphous. The flowers are solitary or racemous, and clustered at branch tips. The seed pods are hairy, ½ to ¾ inch long, and brown when ripe. The pods burst and scatter seeds for several feet. The seeds are smooth and shiny, olive to brownish. The root system consists of a taproot, lateral roots and adventitious roots (Hoshovsky 1989; Parker and Burrill 1991).

Economic Importance: Detrimental: Few invasive, exotic species dominate a site like gorse. It is considered the most unmanageable exotic weed in California (Hoshovsky 1989). Gorse is a fire hazard (Amme 1983), it outcompetes native and beneficial plants causing considerable loss of grassland habitat, and the seeds are viable for 30 years or more, requiring a long-term management plan for control. The biology of gorse is conducive to invasion and establishment. Gorse can: fixate nitrogen; change soil chemistry to prevent nutrient exchange; produce a large heat-tolerant seed bank with seed viability of 30 years or more; and gorse can quickly spread by seed or by vegetative growth from stumps after mechanical injury caused by brush clearing or fire (Hoshovsky 1989).

Habitat: While gorse is found in warm climates (New Guinea, Sri Lanka), it prefers the cool, medium to high rainfall and mid-temperate zones of both the northern and southern hemispheres. It does not survive high elevations (although it is found in the high elevations of Hawaii), extremes in high or low temperatures or arid sites. The best growth is found on well-drained sites, as the nitrogen fixing metabolism slows under wet conditions (Holm et al. 1997). Temperature as well as day length may be limiting factors in distribution. The preferred habitat is sheltered from cold winds, but mature plants do tolerate severe frosts. Short day length prevents flowering and the formation of thorns (Zabkiewicz 1976 as cited in Hoshovsky 1989; King et al. 1996). Gorse has the ability to fix atmospheric nitrogen, and initial sites are often disturbed areas with poor, infertile soils along roadsides and fence rows. However, gorse is not limited to these sites, and it can be found on soils ranging from sand to heavy clay, which includes riparian areas, grasslands and open forests. This plant prefers a pH range of 4 to 5, and is intolerant of lime (Holm et al. 1997).

Geographic Distribution: Gorse is native to western and central Europe, where it is cultivated for hedgerows, and in France it is used as forage for livestock in areas of poor soil. Gorse is a weed in more than 30 countries. It is found in New Zealand, Australia and the western coasts of North and South America, and along the coasts of Denmark and Germany (Holm et al. 1997). Gorse's spread is attributed to Europeans that brought this plant with them to more than 15 countries or islands. It was introduced to large New Zealand estates as forage for sheep on lands that would not support other crops (Bell 1939 as cited in King et al. 1996). It is naturalized in New Zealand and Australia for over 150 years, where much research has been done to control its spread.

History: In the United States, gorse is found on the east coast from Virginia to Massachusetts (Hermann and Newton 1968 as cited in King et al. 1996). On the west coast gorse is found from California to British Columbia, and in the Hawaiian Islands. Gorse was introduced as an ornamental to Oregon when seeds were brought from Ireland, prior to 1894. Gorse was brought to California before 1912 as "a bit of ol' Ireland" (Pryor and Dana 1952 as cited in Hoshovsky 1989). By the 1950's, CA reported over 15,000 acres of gorse along the coastline from Santa Cruz to Del Norte, and OR reported over 25,000 acres (as cited in Hoshovsky 1989). In Washington gorse is reported from 11 counties west of the Cascade Mountains, with an estimated 800 acres in Pacific Co. Gorse is a Class B noxious weed in WA, and it is also a quarantine species – it is illegal to buy or sell this species. Gorse is a Class B noxious weed in OR and CA, and it is a noxious weed in British Columbia, where it is found primarily on southern Vancouver Island and in the Gulf Islands (Invaders Database).

Growth and Development: Young gorse plants are compact, with a rosette-like habit. The leaves are trifoliate at this stage, with thin, expanded leaflets (Boodle 1914 as cited in Hoshovsky 1989). Most growth occurs in spring and early summer. Growth slows in the summer from moisture stress, and it is slowed in winter by the shorter days and colder soil temperatures (McAllen 1990). The plant matures rapidly, and the leaves become narrow and small and eventually pointed (awl-like). During the second stage of gorse development, the foliage leaves harden into spines, spines develop in leaf axils (Millener 1961 as cited in Hoshovsky 1989), the leaf cuticle thickens and the leaf surface produces a thick wax (Balneaves and Zabkiewicz 1981 as cited in Hoshovsky 1989). Photosynthesis takes place mostly in the green stems (MacBean 1990). Gorse is typically shrub-like, but plants growing in exposed, windy habitats can be mat-like or cushion-like, due to the growing tips killed by wind or salt-spray (Boyd 1984; Skipper 1922 as cited in Hoshovsky 1989). Gorse plants live for an estimated 30 years (Chater 1931 as cited in Hoshovsky 1989). Plants grow outward, leaving a center of dry, dead vegetation. Individual plants can be up to 30 feet in diameter (Boyd 1984 as cited in Hoshovsky 1989), forming dense, impenetrable thickets. The combination of dead plant matter and a high oil content create a fire hazard.

The root system consists of a tap root, lateral roots and adventitious roots. Extensive lateral roots are found a couple of inches below the surface. A mat of adventitious roots descending from procumbent branches support the lateral roots (Chater 1931; MacCarter and Gaynor 1980 as cited in Hoshovsky 1989). Nitrogen-fixing bacteria are located in the root nodules of gorse, and they thrive under aerobic conditions, and this fixating metabolism slows if the roots are flooded (Zabkiewicz 1976).

Fire plays a role in the ecology of gorse, and it has been described as a 'fireweed'. Fire cracks the hard and waxy, impermeable seed coat and fire also removes the heavy litter associated with mature plants. This opens an area of light and moisture for seedlings. Plants recover quickly after fire, with regrowth from the stems or from the root crown. While gorse prefers cool, moist habitat, this plant has characteristics that allow it to occupy areas of drought or sites that are sunny, exposed and dry. The characteristics include: spiny leaves covered with thick cuticles; grooved hairy stems; large roots on young plants that allow high water uptake, and they are used as an anchor for exposed, windy sites (MacBean 1990).

Reproduction: Gorse reproduces primarily by seed, but it can also spread vegetatively. Gorse usually produces flowers in late winter or early spring (Jan – Mar), but they may flower throughout the year (Parker and Burrill 1991), depending on the site. Buds only form once, but some flowers delay development. Seeds are developed twice a year. The gorse flowers are complex and one of the most advanced in the legume family. Bees are attracted to this early season pollen source, and they are the primary pollinators. The pollen and style are hidden within the keel (2 fused petals) until the bee trips a release mechanism when landing on the landing platform composed of 2 wing petals (MacBean 1990). Gorse seed has a hard, water-impermeable seed coat. Seeds remain viable for 30 years, with one report of viability after 70 years (Zabkiewicz 1976).

Seeds are ejected from the pod and most fall within 2 meters of the parent plant (Moss 1978 as cited in Hoshovsky 1989). Vehicles, animals and ants spread seeds. Dispersal by birds is not agreed upon, but it probably accounts for plants found along fencelines and under trees (Ridley 1930 as cited in Holm et al. 1997). Streamside gorse seed will also disperse along waterways.

Germination occurs at any time of the year, depending on suitable conditions. Heat stimulates germination, and a light burn will produce a flush of seedlings (Moss 1959; MacCarter and Gaynor 1980 as cited in Hoshovsky 1989). Temperatures above 100 C are lethal (Amme 1983 as cited in Hoshovsky 1989).

Vegetative – gorse can resprout from stumps, resulting in a root system older than the shoot system (Chater 1931 as cited in Hoshovsky 1989). Growth from this type of resprouting will produce flowers after 2 years. Root cuttings will produce flowers 6 months after rooting (Zabkiewicz 1976). Hill (1949 as cited in Hoshovsky 1989) reports spread by rhizomes.

Control: “Control of gorse can be considered in two stages. First is the control of established plants. Second is the control of new plants emerging from seeds that may last more than 30 years in the soil. The most effective control program usually includes a combination of herbicides, burning and cultivation or mowing. Establishing competitive pasture species, forest trees or other crops helps resist gorse invasion as well as other weeds. When using herbicides, it is crucial to thoroughly wet the foliage. The best time to apply herbicides is after bloom drop, but applications at other times usually give good control also.” (William et al., 2000 – from the 2000 PNW Weed Control Handbook).

Response to Herbicide:

Several herbicides are recommended for gorse control, including glyphosate, Crossbow, Tordon, Escort and Banvil, to name a few. For site specific control recommendations, please refer to the most recent version of the PNW Weed Control Handbook referenced in the bibliography (Williams et al. 2000).

Response to Mechanical Methods: Hand pulling - effective on seedlings and plants up to 1 meter or so tall, and before seed production. Seedlings are easiest to remove after rain, when the whole root system is removed. Hand hoeing – effective when gorse is growing with beneficial vegetation nearby. Hoeing, and cutting off the top of plants will expose them to the sun, drying them out. Cutting – before seed production will prevent further dispersal, but the plants will resprout from the stump. Cutting is a necessary step when working with large plants, to remove the above ground portion. Hand-digging – effective on small infestations, is one way to control a plant the capability to resprout from the roots. Chopping, Cutting or Mowing – an option for flat areas. Several mowings may be necessary to deplete root reserves; if only one cut, it is recommended to use before flower production. Cutting is recommended before herbicide application. A cut gorse plant will resprout from the crown in greater density if herbicides are not applied. (Hoshovsky 1989).

Biocontrol Potentials: Goats are cost-effective as a control option on gorse when used against seedlings or on regrowth less than 4 inches high. Goats will defoliate twigs and bark from mature stands of gorse. After a two-year period there was a significant reduction in gorse crowns (Hill 1949 as cited in Hoshovsky 1989). Chickens are effective in potentially reducing the seed bank in mature stands of gorse. The seeds are digested and destroyed, and chickens grazed back the vegetation in areas of one acre or less (Andres 1979 as cited in Hoshovsky 1989).

The gorse weevil (*Apion ulicis*) was introduced from France (Holloway and Huffaker 1957) to California in 1953, and was considered established by 1982 in CA and OR (Julien 1982). The grub eats the seed. When the seed matures and opens, the mature weevil continues to eat the spines and flowers (Cowley 1983). The weevil is only partially successful, as the root reserves enable gorse to recover, and the cool coastal climate of northern California delays the seed pods opening, killing the weevil larva in the pod (Evans 1942 and Amme 1983 as cited in Hoshovsky 1989). The gorse weevil was released in Washington in the mid-1960's, and is presently associated with most populations of gorse along the Pacific Coast (as per conversation with Dr. Gary Piper).

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