



# Pest Management Methods Network

[Canadian Forest Service](#)  
[Pacific Forestry Centre](#)  
Victoria, British Columbia, Canada

## Scotch Broom, *Cytisus scoparius* L. in British Columbia

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*Introduced weed species such as scotch broom may upset indigenous ecosystems and threaten forest regeneration.*



*Scotch broom seeds may survive in a dormant condition for up to 30 years.*

### Strategic Importance

Introduced weeds and pests frequently unbalance indigenous ecosystems, often replacing species or groups of species and suppressing others. Interference by weeds reduces the productive capacity of the land to grow fibre, lengthens rotations, and may reduce the quality of the logs that are produced. Weeds also have the potential to reduce biodiversity.



Scotch broom, *Cytisus scoparius* L., is an exotic, perennial, leguminous weed which threatens forests, pastures and other landscapes of the Pacific and Atlantic coasts of North America. It grows in thickets with stems up to 3 meters tall, effectively preventing light from reaching the ground. Several bean-like seeds can be thrown some distance at maturity from their brown seedpods. Seeds may lie dormant for several decades waiting for the right disturbance and moisture conditions to generate. Scotch broom will invade dry sites with disturbed or exposed mineral soil. Consequently, new forest roads and new partial cutting harvesting techniques may encourage the spread of scotch broom.

Broom has also been introduced to Chile, India, Iran, Australia, New Zealand, South Africa and the United States. In Oregon and Washington, where it is listed as a Class B noxious weed, complete Douglas-fir plantation failures due to Scotch broom have been documented. In California, Scotch broom has infested over a 250,000 ha of rangeland. Scotch broom may be threatening endangered ecosystems such as Garry oak, *Quercus garryana*, woodlands in southwestern British Columbia.

Scotch broom, a native of Europe, was introduced to the West Coast of British Columbia (Vancouver Island) in 1850 by Captain Walter Grant. After nearly one and a half centuries, Scotch broom has expanded its range, occupying many roadsides, utility right-of-ways, and other disturbed areas. Although it is concentrated on the drier, southern portion of Vancouver Island, recently broom has been found on the Queen Charlotte Islands, Langley, Castlegar and Kootenay Lake.

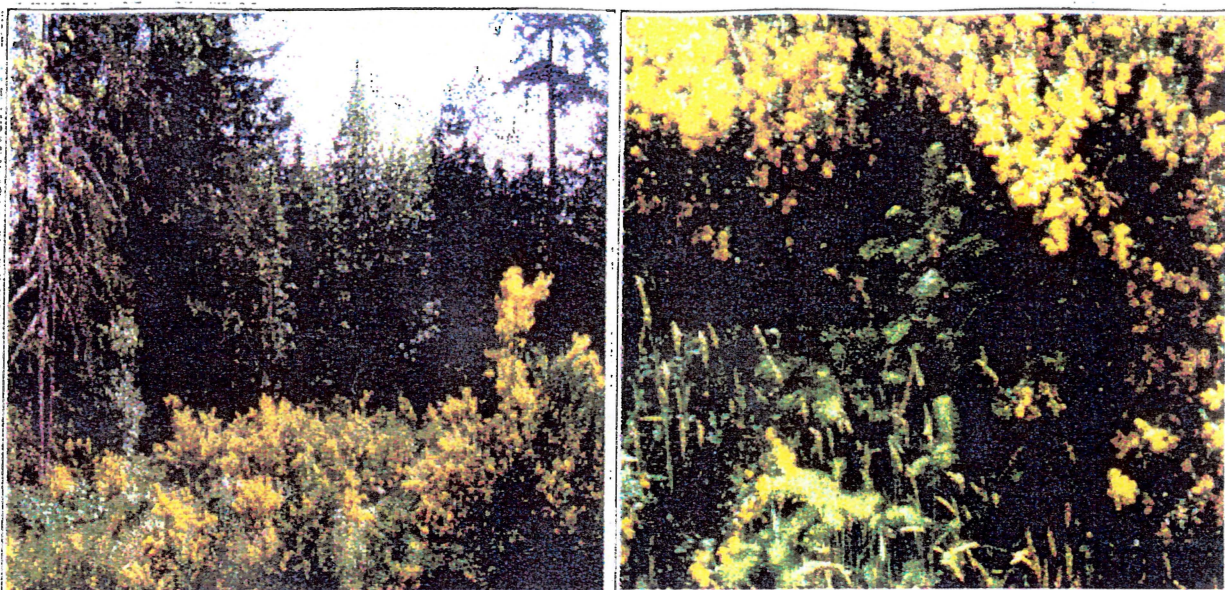
### Invasive Characteristics

Scotch broom rapidly invades disturbed areas, suppressing or displacing native plant species including commercially important conifer seedlings. It has several characteristics that promote its invasiveness:

- a. Capability of forming dense, one-species stands and thickets;
- b. Rapid vertical growth and intense spatial competition;
- c. Tolerant to drought and cold;
- d. Ability to fix nitrogen (when associated with *Rhizobium* spp.) (although this may improve a site, the competitive nature of broom is a greater disadvantage);
- e. Profuse seed production (a mature plant of 3-8 years can produce 2 000 to 3 500 pods, encasing up to nine seeds per pod);
- f. Longevity of seed banks (seeds have an impervious coat enabling them to remain viable in the soil for long periods, with seed counts reaching up to 4140 seeds per square metre.);
- g. Deep roots;
- h. Ability to resprout from stumps;
- i. Long life span (usually from 10 to 15 years although individual plants can live for over 20 years);
- j. Adaptability to various ecological niches; and,
- k. Lack of natural enemies.

The impacts of Scotch broom competition on conifer seedlings has not been adequately researched and measured. A typical invasion site is located at Maple Mountain within the North Cowichan Municipality (fig. #3 & 4). This site is a recent cut-over area, planted with (2+1) Douglas-fir, *Pseudotsuga menziesii*, seedlings. Scotch broom has rapidly invaded this site, forming a dense canopy, and over-topping the conifer seedlings. It has been very effective in blocking light; up to 71% of the photosynthetically active radiation was stopped from reaching the Douglas fir seedlings. Consequently, after two years, the broom competition significantly reduced their height and diameter growth.





*Scotch broom invasion of a site at Maple Mountain within the North Cowichan Municipality*

## Management techniques

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Several techniques have been used to control Scotch broom in urban areas or forest plantations. Unfortunately, most current control techniques are not particularly effective.

### *Manual cutting or pulling:*

Manual or hand pulling can be effective if care is taken to extract all of the stump and roots, minimize soil disturbance, and not spread seed. This technique is very labour intensive and costly. Unfortunately, the treatment needs to be repeated over a number of years because of broom's ability to resprout. Frequently, hand pulling disturbs the surrounding soil and creates ideal conditions for additional broom seeding.

### *Mechanical cutting or pulling:*

Brush rakes, straight blading, and hydroaxes with tracked vehicles have been used to uproot, pile or crush broom thickets. Mechanical cutting with bulldozers or other heavy equipment is very costly. While effective in removing large stems in preparation for conifer planting, the large amount of disturbed soil creates an ideal situation for broom resprouting. In addition, broom seeds may stick to equipment and be distributed further either throughout the site or to other areas in which the equipment may work in the future.

### *Burning*

Burning broom-infested sites has been used to remove flowering stalks. However, broom seeds germinate readily in the soil after light to moderately



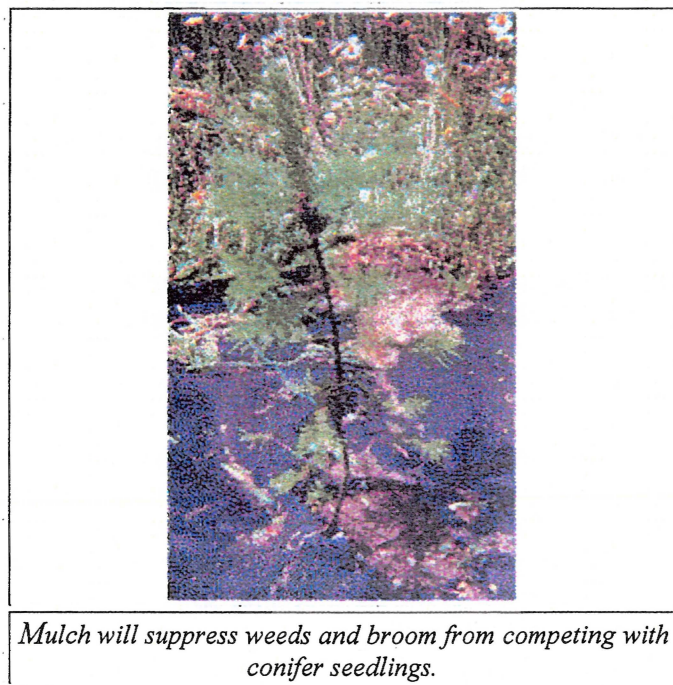
severe burns and broom colonies quickly re-establish. In addition, burning may be undesirable in certain areas due to smoke pollution.

### *Herbicide application*

While 2,4-D, triclopyr, picloram and hexazinone have been successful in some regions, the application of herbicide is controversial. (Glyphosate has produced inconsistent results.)

### *Mulch*

Surrounding conifer seedlings with canvas moss or landscape fabric prevents weeds, grasses and broom from competing with the seedlings. (Fig.5) While this method is effective for research or horticulture, it is very costly and labor intensive for forest operations. Alternative species such as grasses and clovers have been seeded to reduce competition. However, broom is effective in establishing and out-competing these species.



### *Biological control - sheep grazing*

Using sheep and goats to control broom has been attempted in Canada, the United States and New Zealand. The results have not been successful, particularly in plantations where animals may cause additional damage to the site or to conifer seedlings.

### *Biological control - insects and mites*

Biocontrol strategies using parasitic insects and mites have been attempted in some jurisdictions. For the most part, while broom populations may be reduced, enough seed matures and escapes to enable the broom to spread.



### *Biological control - fungal pathogens*

Under experimental conditions, three fungal pathogens, *Fusarium tumidum*, *Pleiochaeta setosa* and *Chondrostereum purpureum*, have been investigated and have shown some promise for application in British Columbia. However, more research is required and a commercial bioherbicide agent is not yet available operationally.



*Flowering Scotch broom in Garry oak woodland.  
Broom seeds or flowers attached to vehicles can  
be transported to disturbed soils.*

### Control Procedures

Until an acceptable biological agent is adequately researched and registered as a biological control agent in British Columbia, the following actions are recommended to forest managers:

1. Carefully inspect road ballast and materials brought from other areas for broom seed.
2. Bring new invasions to the attention of researchers, forest managers and the local British Columbia Ministry of Forest's District office.
3. Cut broom and gorse stems as close to the ground as possible before the seed matures, taking care not to disturb surrounding soil. (Hand-pulling is preferable to prevent resprouting, but this is not always practical.)
4. Remove broom before it has a chance to flower.
5. Inspect plantations on a regular basis.
6. Support urban efforts to remove scotch broom in parks.
7. Where broom invasion is likely, selective timber extraction should be considered over clearcutting.
8. On warm, well-drained sites, avoid excessive soil disturbance and exposed mineral soil.

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## **Additional Reading**

Nilsen, E.; Karpa, D.; Mooney, H.; Field, C. 1993. Patterns of stem photosynthesis in two invasive legumes (*Cytisus scoparius*, *Spartium junceum*) of the California coastal region. *Am. J. Bot.* 80:1126-1136.

Peterson, D.; Prasad, R. 1997. The biology of Canadian weeds, *Cytisus scoparius* (L.) Link. *Can. J. Pl. Sci.* 78:497-504.

Prasad, R. 1997. Evaluation of some fungi for bioherbicidal potential against Scotch broom under greenhouse conditions. *Proc. Weed Science Society of America*, Chicago, Feb. 8-12, 1997. Vol. 39:93-94

Prasad, R. 1998. Impact of some exotic weeds (Scotchbroom and gorse) on forest crop in British Columbia. *Proc. Western Soc. Weed Sci.*, Hawaii. March 8-12, 1998.

Smith, J.; Hosking, J. 1994. Broom in Australia. *Oreg. Dept. Agric. Weed Contr. Prog.*, Broom/Gorse Q. 3:1-4.

Williams, P.A. 1981. Aspects of ecology of broom (*Cytisus scoparius*) in Canterbury, N.Z. *N.Z. J. Bot.* 32:373-383.

Zielke, K.; Boateng, J.; Caldicott, N.; Williams, H. 1992. Broom and Gorse: A forestry perspective problem analysis. B.C. Ministry of Forests, Queens printer Victoria, B.C. 20 p.

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