

common eyebright

Euphrasia nemorosa (Pers.) Wallr.

Synonyms: *Euphrasia americana* auct. non Wettst., *E. arctica* ssp. *borealis* (Townsend) Yeo, *E. borealis* (Townsend) Wettst., *E. brevipila* auct. non Burnat & Gremlı, *E. canadensis* auct. non Townsend, *E. curta* (Fries) Wettst., *E. glabrescens* Reuter ex Ardoıno, *E. nemorosa* (Pers.) Wallr. ssp. *curta* (Fr.) Asch. & Graebn., *E. nitidula* Reuter, *E. officinalis* auct. non L., *E. officinalis* L. ssp. *nemorosa* (Pers.) Celak. 1871, non Nyman 1881, *E. officinalis* L. var. *curta* Fr., *E. officinalis* L. var. *nemorosa* Pers., *E. pectinata* auct. non Ten., *E. rostkoviana* Hayne forma *borealis* F. Towns., *E. stricta* D.Wolff var. *curta* (Fr.) Jalas, *E. stricta* D.Wolff var. *tatarica* sensu Fernald & Wiegand, non (Fisch. ex Spreng.) Hartl, *E. stricta* sensu Fernald & Wiegand, p.p., *E. tatarica* auct. non Fisch. ex Spreng.

Other common name: none

Family: Orobanchaceae

Invasiveness Rank: 42 The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

Description

Common eyebright is an annual that grows 10 to 40 cm tall from a taproot. The stems are simple or freely branched, erect, and slightly hairy to pubescent. Plants have a small numbers of leaves. Leaves are deep green, sessile, ovate, and 5 to 15 mm long. Each leaf has palmate veins and 7 to 11 prominent teeth. The undersides of leaves can be sparsely hairy. The flowers, which are located in the axils of leafy bracts, have both male and female reproductive parts. The bracts are similar to the leaves, but are larger and have bristle-tipped teeth; bracts are arranged in crowded terminal spikes that are 3 to 15 cm long. The calyces are tubular. Corollas are white or pale lavender, pubescent outside, and 5 to 10 mm long. The upper lip has two lobes, whereas the lower lip has three notched, oblong, spreading lobes with purple lines and a yellow spot. The fruits are flattened, smooth, oblong capsules that measure 4 to 8 mm long. Seeds are 1 to 2 mm long and narrowly winged (eFloras 2008, Klinkenberg 2010, Plants for a Future 2010).



Euphrasia nemorosa L. Photo by V. Hume

Similar species: Two *Euphrasia* species look similar to common eyebright and are native to Alaska: arctic eyebright (*Euphrasia subarctica*) and subalpine eyebright (*E. mollis*). These species grow on dry, grassy heaths, along paths, in open woods, and on chalky and acidic soils. Subalpine eyebright can be differentiated from common eyebright by its 1 to 4 rounded teeth on each side of its leaves and white pubescence on the tops and bottoms of its leaves. The corollas of subalpine eyebright are white with purple lines and lavender upper lips. Arctic eyebright has white to yellow corollas that are 3 to 4 mm long (Hultén 1968, Cody 1996, Klinkenberg 2010, USDA 2010).

Ecological Impact

Impact on community composition, structure, and interactions: Common eyebright is hemiparasitic; it forms haustoria on the roots of other plants and may weaken native plants establishing in disturbed sites. While it is able to grow without a host, common eyebright grows best with a host, especially if that host has the ability to fix nitrogen (Yeo 1964). In Southeast Alaska, common eyebright has been observed growing through moss in native plant communities and along wetland margins in undisturbed areas (Feierabend and Schirokauer 2008). This species is often associated with herbaceous-roadside plant communities on imported fill in Alaska (AKEPIC 2010), where it probably causes minor changes in native forb density. The *Euphrasia* genus is notorious for weak interspecific crossing barriers (French et al. 2003), and common eyebright may hybridize with native species.

Impact on ecosystem processes: Common eyebright is a colonizer of disturbed areas in its native range in northwestern England (Ash et al. 1994). In Southeast Alaska, however, it has been observed growing through moss in native vegetation and along wetland margins in undisturbed areas (Feierabend and Schirokauer 2008).

Due to its hemiparasitic nature, common eyebright will compete with native species for space and nutrients (Yeo 1964).

Biology and Invasive Potential

Reproductive potential: Common eyebright reproduces by seed (Yeo 1964). Areas that were cleared of all vegetation at Nelson Slough in Southeast Alaska were rapidly reinfested by common eyebright (Feierabend and Schirokauer 2008). This species spread quickly after being introduced onto industrial waste heaps in northwestern England (Ash et al. 1994), indicating that it is at least somewhat aggressive in its reproduction. No data on seed viability is available.

Role of disturbance in establishment: Common eyebright primarily germinates in disturbed areas that have some exposed mineral soil (Cortés-Burns and Flagstad 2009). It has been observed in Southeast Alaska spreading from disturbed areas to undisturbed mossy areas, where it grows amongst native vegetation. Seedlings even germinated under thick mats of grasses and lupines (Feierabend and Schirokauer 2008).

Potential for long-distance dispersal: Seeds have no specialized mechanisms for long-distance dispersal (Horwood 1919). *Euphrasia* species do not generally disperse long distances (Murphy and Downe 2006).

Potential to be spread by human activity: Common eyebright has been documented around the Haines Airport and is commonly associated with areas that have been disturbed by fill importation in Southeast Alaska (Feierabend and Schirokauer 2008, AKEPIC 2010). Infestations occur primarily near areas associated with human activities, such as Kincaid Park in Southcentral Alaska (Cortés-Burns and Flagstad 2009) and a variety of roads, trails, campgrounds, and towns in Southeast Alaska (Feierabend and Schirokauer 2008).

Germination requirements: Common eyebright germinates in the spring. Germination rates are increased by exposure to cold winter temperatures (Yeo 1961).

Growth requirements: Common eyebright can grow in most soil types. It can tolerate semi-shade and alkaline conditions (Plants for a Future 2010). It grows best in calcareous soils and often grows in chalk grassland in England, where it is native (Kelly 1989, Lady Bird Johnson Wildflower Center 2010). It requires fairly moist conditions; mortality rates increase significantly during periods with little precipitation (Kelly 1989). Common eyebright flowers from June to September (Lady Bird Johnson Wildflower Center 2010).

Congeneric weeds: No other *Euphrasia* species are known to occur as non-native weeds.

Legal Listings

- Has not been declared noxious (it is listed as a legally protected, critically imperiled rare species in

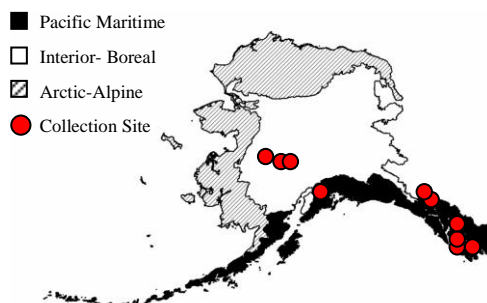
Michigan)

- Listed noxious in Alaska
- Listed noxious by other states
- Federal noxious weed
- Listed noxious in Canada or other countries

Distribution and Abundance

Common eyebright grows in disturbed areas, waste places, roadsides, fields, and clearings (Klinkenberg 2010). In Europe, where it is native, common eyebright grows well in clearings and forested edges of previously disturbed sites, dry meadows, pastures, and chalk grasslands (Kelly 1989, Ash et al. 1994, Lid & Lid 1998).

Native and current distribution: Common eyebright is native to Europe. Populations are present in arctic and subarctic regions in Norway (University Museums of Norway 2010, Vascular Plant Herbarium Trondheim 2010). Common eyebright is considered native to Michigan and Quebec (Michigan Natural Features Inventory 2007, NatureServe 2009, Klinkenberg 2010). The current range of common eyebright in North America includes New England, Minnesota, Michigan, Washington, eastern Canada, Alberta, and British Columbia (USDA 2010). It has also been collected from parts of Asia, Africa, and New Zealand (Harvard University Herbaria 2007, Botanic Garden and Botanical Museum Berlin-Dahlem 2010, GBIF New Zealand 2010). This species is well established in wetland and pond areas in the Dyea flats (AKEPIC 2010)



Distribution of common eyebright in Alaska

Management

Control of common eyebright by repeated hand-pulling was marginally to moderately effective in Klondike Gold Rush National Historic Park. Hoeing is more effective than hand-pulling for small infestations, but it requires the removal of native flora in addition to the target species. Neither hand-pulling nor hoeing are efficient control methods for large infestations (Feierabend and Schirokauer 2008).

References:

- AKEPIC database. Alaska Exotic Plant Information Clearinghouse Database. 2010. Available: <http://akweeds.uaa.alaska.edu/>
- Ash, H., R. Gemmell, and A. Bradshaw. 1994. The Introduction of Native Species on Industrial Waste Heaps: A Test of Immigration and Other Factors Affecting Primary Succession. *Journal of Applied Ecology*. 31(1). 74-84.
- Botanic Garden and Botanical Museum Berlin-Dahlem, Staatliches Museum für Naturkunde Stuttgart, Herbarium. 2010. Accessed through GBIF (Global Biodiversity Information Facility) data portal (<http://data.gbif.org/datasets/resource/1100>, 2010-09-13). Stuttgart, Germany.
- Cody, W. 1996. Flora of the Yukon Territory. National Research Council of Canada Monograph Publishing Program. Ottawa, ON. 634 p.
- Cortés-Burns, H. and L. Flagstad. 2009. Invasive Plant Inventory and Bird Cherry Control Trials Phase I: Non-Native Plants Recorded Along Four Anchorage Municipality Trail Systems. Report on file with the Municipality of Anchorage and Anchorage Parks Foundation. Anchorage, AK. 172 p.
- eFloras. 2008. Published on the Internet <http://www.efloras.org> [accessed 23 September 2010]. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA.
- Feierabend, D. and D. Schirokauer. 2008. Exotic Plant Management Klondike Gold Rush National Historic Park. Report on file with the Klondike Gold Rush National Historic Park, National Park Service. Skagway, AK. 24 p.
- GBIF New Zealand, New Zealand National Plant Herbarium (CHR). 2010. Accessed through GBIF (Global Biodiversity Information Facility) data portal (<http://data.gbif.org/datasets/resource/474>, 2010-09-13).
- Harvard University Herbaria. 2007. Accessed through GBIF (Global Biodiversity Information Facility) data portal (<http://data.gbif.org/datasets/resource/1827>, 2010-09-13) Harvard University. Cambridge, MA.
- Horwood, A. 1919. British Wild Flowers – In Their Natural Haunts. Vol 5-6. The Gresham Publishing Company.
- Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.
- ITIS. 2010. Integrated Taxonomic Information System. <http://www.itis.gov/>
- Kelly, D. 1989. Demography of short-lived plants in chalk grassland. II. Control of mortality and fecundity. *Journal of Ecology*. 77(3). 770-784 p.
- Klinkenberg, B. (Editor) 2010. *Euphrasia nemorosa* (Pers.) Wallr. In: E-Flora BC: Electronic Atlas of the Plants of British Columbia. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia. Vancouver, BC. [10 September 2010] Available: <http://www.geog.ubc.ca/biodiversity/eflora/index.shtml>
- Lady Bird Johnson Wildflower Center. 2010. *Euphrasia nemorosa* (Pers.) Wallr. In: Native Plant Database. University of Texas at Austin. Austin, TX. [4 October 2010] Available: http://www.wildflower.org/plants/result.php?id_plant=EUNE3
- Michigan Natural Features Inventory. 2007. Rare Species Explorer (Web Application). [30 September 2010] Available: <http://web4.msue.msu.edu/mnfi/explorer>
- Murphy, A. and J. Downe. 2006. National Recovery Plan for the Purple Eyebright *Euphrasia collina* ssp. *muelleri*. Victorian Government Department of Sustainability and Environment. Melbourne, Australia. [14 October 2010]. Available: <http://www.environment.gov.au/biodiversity/threatened/publications/pubs/e-collina.pdf>
- NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. [4 October 2010] Available: <http://www.natureserve.org/explorer>
- Plant Hardiness. 2007. Natural Resources Canada. [4 October 2010] Available: http://www.planthardiness.gc.ca/ph_main.pl?lang=en
- Plants for a Future. 2010. [4 October 2004] Available: <http://www.pfaf.org/user/default.aspx>
- University Museums of Norway (MUSIT). 2010. Accessed through GBIF data portal, <http://data.gbif.org/datasets/resource/1996>, 2010-10-06) Oslo, Norway.
- USDA. 2010. The PLANTS Database. National Plant Data Center, Natural Resources Conservation Service, United States Department of Agriculture. Baton Rouge, LA. <http://plants.usda.gov>
- Vascular Plant Herbarium, Trondheim (TRH). 2010. Accessed through GBIF (Global Biodiversity Information Facility) data portal (<http://data.gbif.org/datasets/resource/7978>, 2010-09-13). Natural History Museum, University of Oslo. Trondheim, Norway.
- Yeo, P. 1961. Germination, Seedlings, and the Formation of Haustoria in *Euphrasia*. *Watsonia*.

5. 11-22 p.

Yeo, P. 1964. The growth of Euphrasia in cultivation.
Watsonia 6. 1-24.