white sweetclover
Melilotus alba Medikus

Synonyms: *Melilotus albus* Medik.
Other common names: None
Family: Fabaceae

Invasiveness Rank: **81** 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
White sweetclover is a biennial plant that grows from 61 to 152 ½ cm tall. Stems are erect and branched. Leaves are trifoliate, alternate, and 13 to 64 mm long. Flowers are fragrant, white, 3 to 6 mm long, and arranged in many-flowered terminal and axillary racemes. Plants generally flower from June to October during their second year and then die. Pods are normally black to dark grey with a single seed each. Seeds are yellow and ovate to kidney-shaped (Hultén 1968, Royer and Dickinson 1999).

Melilotus alba Medikus

Similar species: White sweetclover can be distinguished from all other trifoliate legumes in Alaska because it is erect, tall, and branching. White sweetclover has white flowers, whereas yellow sweetclover (*Melilotus officinalis*) has yellow flowers.

Leaves of *Melilotus alba* Medikus

Ecological Impact
Impact on community composition, structure, and interactions: White sweetclover degrades natural grassland communities by overtopping and shading native species. It contains coumarin, which is toxic to animals. The flowers are visited by introduced honeybees, native solitary bees, wasps, and flies (Eckardt 1987). White sweetclover is associated with over 28 viral diseases (Royer and Dickinson 1999, CUPPID 2003). It is allelopathic (USDA 2002).
Impact on ecosystem processes: White sweetclover alters soil conditions by fixing atmospheric nitrogen (USDA 2002). It has the potential to alter the sedimentation rates of river ecosystems (M. Shephard – pers. comm.).

Biology and Invasive Potential

Reproductive potential: Each plant is capable of producing up to 350,000 seeds. Seeds can remain viable in the soil for up to 81 years (Klemow and Raynal 1981, Rutledge and McLendon 1996, Royer and Dickinson 1999). Large seed banks are common (Eckardt 1987).

Role of disturbance in establishment: White sweetclover readily invades open areas. Natural and human-caused fires produce excellent growing conditions because they scarify seeds and stimulate germination. Clearings in forested lands are easily colonized by white sweetclover. This plant has established extensively along early successional river bars on a number of river systems in interior, south-central, and southeast Alaska. White sweetclover resprouts readily when cut or grazed (Eckardt 1987, WDNR 2003).

Potential for long-distance dispersal: Seeds can be dispersed by the movement of water (Eckardt 1987, Rutledge and McLendon 1996).

Potential to be spread by human activity: White sweetclover is used extensively as a forage crop, soil builder, and nectar source for honeybees (Eckhardt 1987, WDNR 2003). Seeds can be transported on vehicle tires. This species has been documented as a contaminant in cereal grains (Royer and Dickinson 1999, Densmore et al. 2001).

Germination requirements: White sweetclover has high seed viability. Seeds do not require cold-stratification to germinate. Most seeds germinate and develop into seedlings in the spring with sufficient moisture. Temperatures of less than 15°C are optimal for germination; germination is inhibited at temperatures above 15°C (Eckardt 1987).

Growth requirements: White sweetclover is adapted to all soil textures with pH levels between 5 and 8. It is tolerant of fire, high calcium carbonate ($CaCO_3$) contents, and moderate salinity, but it cannot tolerate shade. This species can withstand temperatures as low as -39°C. It requires 120 frost-free days to grow and reproduce successfully (USDA 2002).

Congeneric weeds: Yellow sweetclover (*Melilotus officinalis*) is an invasive species in Alaska with an invasiveness rank of 69 (AKEPIC 2010). Several *Melilotus* species are known to occur as non-native weeds in North America (USDA 2002).

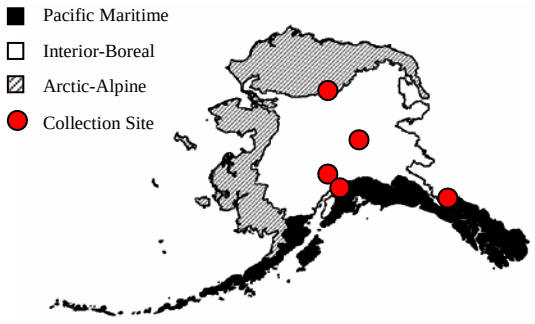
Legal Listings

- ☐ Has not been declared noxious
- ☐ Listed noxious in Alaska
- ☐ Listed noxious by other states
- ☐ Federal noxious weed
- ☒ Listed noxious in Canada or other countries (QC)

Distribution and Abundance

White sweetclover was first reported in North America as early as 1664 as a forage crop. It has spread from cultivation and thrives in waste places and roadsides. White sweetclover can be found in all 50 states of the U.S. and all but two Canadian provinces (Royer and Dickinson 1999, USDA 2002). It establishes in aspen woodlands, prairies (Butterfield et al. 1996, Rutledge and McLendon 1996), and riparian communities (Stensvold 2000, Conn 2003).

Native and current distribution: White sweetclover is native to the Mediterranean area and from central Europe to Tibet. It has been introduced into South Africa, North America, South America, New Zealand, Australia, and Tasmania (Hultén 1968). This species has been documented from all three ecogeographic regions of Alaska (AKEPIC 2010).



Distribution of white sweetclover in Alaska

Management

White sweetclover infestations can be managed with mechanical control methods, such as pulling and cutting; however, several treatments may be necessary. Biological control options have not been investigated because of the plant's value as an agricultural crop. Because seeds remain viable for a long time, sites must be monitored for many years following control actions (Eckardt 1987, J. Conn – pers. comm.).

References:

AKEPIC database. Alaska Exotic Plant Information Clearinghouse Database. 2010. Available: http://akweeds.uaa.alaska.edu/

Butterfield, C., J. Stubbendieck, and J. Stumpf. 1996. Species abstracts of highly disruptive exotic plants. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/plants/exoticab/index.htm (Version 16JUL97).

Conn, J. 2003. White sweet clover invasions on Alaskan rivers. Paper presented at 2003 Alaska Noxious and Invasive Plants Management Workshop. Anchorage, Alaska.

Conn, J., Ph.D., Weed Scientist, USDA Agricultural Research Service, P.O. Box 757200, Fairbanks, Alaska 99775-7200. Tel: (907) 474 2423. – Pers. comm.

CUPPID - Cornel University: Poisonous Plants Informational Database. http://www.ansci.cornell.edu [Oct 29, 2003].

Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

Eckardt, N. 1987. Element stewardship abstract for *Melilotus alba* – sweetclover or white sweetclover, *Melilotus officinalis* – yellow sweetclover. The Nature Conservancy, Minneapolis. 10 pp.

Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.

Invaders Database System. 2010. University of Montana. Missoula, MT. http://invader.dbs.umt.edu/

Klemow, K.M. and D.J. Raynal. 1981. Population Ecology of *Melilotus alba* in a limestone quarry. Journal of Ecology 69: 33-44.

Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

Rutledge, C.R., and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/plants/explant/index.htm (Version 15DEC98).

Shephard, M. Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503. Tel: (907) 743-9454 - Pers. com.

Stensvold, M. 2000. Noxious weed surveys and projects conducted on the Tongass National Forest 1997-2000. Technical report on file, Tongass National Forest. 2 pp.

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

WDNR - Wisconsin Department of Natural Resources. 2003. Yellow sweet clover (*Melilotus officinalis*) White sweet clover (*Melilotus alba*). www.dnr.state.wi.us/org/land/er/invasive/factsheet/clovers.htm