NAPPO
ORGANISATION NORD-AMERICAINE POUR LA PROTECTION DES PLANTES
NORTH AMERICAN PLANT PROTECTION ORGANIZATION
ORGANIZACION NORTEAMERICANA DE PROTECCION A LAS PLANTAS

PEST FACT SHEET

Galeopsis tetrahit L.

A member of the Lamiaceae (the mint family), *Galeopsis tetrahit* L. is an introduced, Eurasian, annual weed, reproducing only by seed and occupying a wide range of habitats, that was well naturalized in North America (the US and Canada) by the 1800's and is common around barns and in rich damp soils. The plant is easily distinguished, even from other members of the mint family by the thickened stem sections below the nodes and by the bristly hairs that cover the stems and tend to penetrate the skin if handled. These hairs, and a calyx that is armed with five sharp points may act as a protective mechanism that contribute to the plant's survival. The seeds of this weed are a serious contaminant of small grains and can cause difficulty in cleaning the crop seed. No records have been located for this weed in Mexico.

Preferred Scientific Name *Galeopsis tetrahit* L.

Other Scientific Names *Galeopsis bifida* Boenn.
Galeopsis praecox Jord.
*Galeopsis reichenbachi*i Reut.
Tetrahit nodosum Moench

Common Names English - hemp-nettle, Dog nettle, common hemp-nettle, Bee nettle, Flowering nettle, hempnettle (United States), wild hemp, ironweed, brittle-stem hemp nettle, brittlestem hempnettle, ironwort, simon's weed
French - ortie royale, chambreule, chanvre batard, chanvre folle, chanvre sauvage, chardonret, chevenelle, cramois, donate, galéope piquant, galéope tétrahit, galéopse, galéopside, galéopside à tige carrée, galéopside tétrahit, geneviève, gratte

Habitat

Preferring a cool, damp climate in its native Europe, this species of hemp-nettle is often found in association with spring cereals and vegetable crops on aerated, humus-rich, nutrient-rich and adequately watered soils (Hanf 1983). This common weed is generally found in waste places, cultivated fields and along roadsides (Crompton *et. al* 1988) and in open woods (Frankton and Mulligan 1987), gardens, pastures and barnyards (O'Donovan and Sharma 1987). O'Donovan (1985) determined that hemp-nettle will grow and reproduce over a wide range of temperatures but is considerably inhibited by low soil moisture levels, suggesting that soil moisture may be more significant than temperature in limiting distribution. O'Donovan and Sharma (1987) note that while present at significant levels in parts of Alberta, Saskatchewan and Manitoba, this weed is generally absent from the "drier brown soil zones of the southern prairies" of the two westernmost provinces. Other authors have also noted that, in Saskatchewan, hemp-nettle demonstrates a significant preference for the "moister, richer black and gray soils than the less favorable brown soils" (Thomas and Wise 1983).

Most agricultural soils in the temperate regions of the world will support populations of *G. tetrahit* and the optimum pH range for growth has been determined to be between 5 and 6 (Spurway 1941).

Distribution List

Asia

Widespread - Hanf 1983)

Europe

Albania (USDA, ARS 2003)
Austria (USDA, ARS 2003)
Belarus (USDA, ARS 2003)
Belgium (USDA, ARS 2003)
Bulgaria (USDA, ARS 2003)
Czechoslovakia (Holm *et al.* 1991)
Denmark (USDA, ARS 2003)
England (Holm *et al.* 1991)
Estonia (USDA, ARS 2003)
Finland (Holm *et al.* 1991)
France (USDA, ARS 2003)
Germany (Holm *et al.* 1991)
Greece (USDA, ARS 2003)
Hungary (USDA, ARS 2003)
Ireland (USDA, ARS 2003)
Italy (USDA, ARS 2003)
Latvia (USDA, ARS 2003)
Lithuania (USDA, ARS 2003)
Netherlands (USDA, ARS 2003)
Norway (Holm *et al.* 1991)
Poland (USDA, ARS 2003)
Portugal (USDA, ARS 2003)
Romania (USDA, ARS 2003)
Soviet Union (Holm *et al.* 1991)
Spain (Holm *et al.* 1991)
Sweden (USDA, ARS 2003)
Switzerland (USDA, ARS 2003)
Ukraine (USDA, ARS 2003)
United Kingdom (USDA, ARS 2003)
Yugoslavia (USDA, ARS 2003)

Africa

Tunisia (Holm *et al.* 1991)

North America

Canada (NF, NS, PE, NB, PQ, ON, MB, SK, AB, BC) (O'Donovan and Sharma 1987)
Mexico (Sonora, Zacatecas, Baja California, Coahuila, Querétaro, Chihuahua, y Guanajuato
USA Alaska (O'Donovan and Sharma 1987)
Connecticut (USDA, ARS 2003)
Idaho (USDA, ARS 2003)
Illinois (USDA, ARS 2003)
Iowa (USDA, ARS 2003)
Louisiana (USDA, ARS 2003)
Maine (USDA, ARS 2003)
Maryland (USDA, ARS 2003)
Massachusetts (USDA, ARS 2003)
Michigan (USDA, ARS 2003)
Minnesota (USDA, ARS 2003)
Missouri (USDA, ARS 2003)

Montana (USDA, ARS 2003)
New Hampshire (USDA, ARS 2003)
New Jersey (USDA, ARS 2003)
New York (USDA, ARS 2003)
North Dakota (USDA, ARS 2003)
Ohio (USDA, ARS 2003)
Oregon (USDA, ARS 2003)
Pennsylvania (USDA, ARS 2003)
Rhode Island (USDA, ARS 2003)
South Dakota (USDA, ARS 2003)
Vermont (USDA, ARS 2003)
Washington (USDA, ARS 2003)
West Virginia (USDA, ARS 2003)
Wisconsin (USDA, ARS 2003)

Oceania

New Zealand (Holm *et al.* 1991)

Distribution Notes

Widespread in Europe and Asia (Hanf 1983), introduced and considered common in Canada by 1884 (Royer and Dickinson 1999), it is now recognized as being widely distributed throughout Canada to the northern limits of agriculture although less common in the drier southern prairies (Frankton and Mulligan 1987). It occurs more or less in a band that covers the northern half of the USA and also in Alaska (O'Donovan and Sharma 1987) and Louisiana (USDA ARS 2003). It can be a serious problem in cultivated fields in regions of Alberta, Saskatchewan and Manitoba (O'Donovan and Sharma 1987).

No records have been located for this weed in Mexico.

Biology and Ecology

In Europe, approximately 2800 seeds are produced per plant, germinating at 1 - 4 cm in depth, at low temperatures early in the year, but only after overwintering and only capable of surviving in the soil for a few years (Hanf 1983). The plant is self-fertile and mainly autogamous (Muntzing 1930) and does not reproduce vegetatively. Other than seeds, there are no overwintering survival structures and plants die off completely at the end of the growing season each year

Mature seeds shed by the plant may be dispersed by wind and water, and in cultivated fields, seeds are scattered and spread by farm machinery during the operations of seeding, tillage and harvesting (O'Donovan and Sharma 1987). The same authors acknowledge that longer distance dispersal of this pest can also occur as a contaminant of crop seed and Conn and Delapp (1982) also discuss the importance of weed-free livestock feed and sanitation of farm machinery in preventing introduction into previously weed-free areas.

Although *G. tetrahit* has strong dormancy characteristics (Hofsten 1947), there exists considerable variation in dormancy and in seed germination among lines of this species (Muntzing 1930). Germination appears to be most successful under low temperatures (13^0C) with none occurring above 25^0C (Lauer 1953).

Economic Impact

The plant is regarded as "a serious competitor with crops for both moisture and soil nutrients" (Royer and Dickinson 1999) with reported yield losses of 24% in wheat and 25% in canola. Infestations of about 170 plants m^{-2} reduced wheat yields by 24% (Dew 1979) and a plant density of 400 hemp-nettle plants m^2 reduced yields of oats and alfalfa by 30% and 85% respectively (Deschenes and Legere 1982). Further, as densities of the weed are decreased, the remaining plants of this very "plastic" species may tend to become more widely branched resulting in little change in crop yield with reduced numbers of individual weeds Scragg and McKelvie 1976). Individual plants can develop considerable leaf area, even under low light intensities (O'Donovan and Sharma

1987). Additionally, the seeds of this weed are a serious contaminant of small grains and can cause difficulty in cleaning the crop seed.

This weed can form dense stands in pastures, roadsides and other waste places and can also serve as a reservoir for the potato fungus, *Phoma exigua* (Adam and Todd 1974), and the nematodes, *Ditylenchus dipsaci* (Bendixen *et al. 1979*), *Heterodrea galeopsidis* (Solov'eva *et al.* 1976) and *Heterodera* spp. (Stelter 1979).

Morphology

Galeopsis tetrahit is an annual with square stems, simple or branched, (30 - 80 cm high), usually swollen below the joints with stiff, bristly, downward-pointing hairs, particularly numerous below the joints. The plant has a tap root system with branched laterals. Leaves are opposite in arrangement, oblong-ovate, 5 - 10 cm long, 1 - 5 cm wide on petioles 1 - 3 cm long, softly hairy on both sides but more densely covered on the upper surface, and regularly, coarsely toothed (Hanf 1983). Flowers may be red or white, in dense clusters in the axils of the upper leaves and without stalks. Flowering takes place from July to October in Europe (Hanf 1983) (July to September in Canada; more specifically, mid-July to mid-August in Ontario (Alex 2001)). Overall, the plant is described by Frankton and Mulligan (1987) as being a variable species with respect to flower color and size and leaf shape. Plants with small purplish flowers and leaves wedge-shaped at the base are sometimes called *Galeopsis tetrahit* L. var. *bifida* (Boenn.) Lej. & Court).

Mature seeds are borne in groups of four per fruit, each about 3 mm long, and somewhat egg-shaped, the base with a prominent round scar and greyish brown with darker spots, the surface sprinkled with whitish warts. Somewhat similar in shape to the seed of common hemp, seeds of *G. tetrahit* are generally shed before crops are harvested. Under artificial conditions, in Canada, O'Donovan (unpublished data) showed that average seed production per plant to be highest at 387, significantly less then European specimens as previously noted by Hanf (1983), growing at a day/night temperature of 23/15 ^{0}C and a 16 hour photoperiod with lowered production at reduced temperatures.

According to Frankton and Mulligan (1987), "hemp-nettle appears to have originated as a hybrid between two European species of *Galeopsis*. When these two species were artificially crossed in Sweden, the resulting plants were indistinguishable from hemp-nettle". Generally, hemp nettle is a variable species with respect to flower color and size and leaf shape (Frankton and Mulligan 1987). Overall, the plant is covered with bristly hairs and the calyx is armed with five sharp points which may act as a protective mechanism and contribute to the plant's survival (O'Donovan and Sharma 1987).

Similarities to other species/conditions

Hemp-nettle is not easily confused for other plants, including those of the mint family to which this species belongs.

Control

Cultural Control

Since hemp-nettle germinates early in the growing season, a certain amount of control applied mechanically (cultivation) and delayed crop seeding may curtail early flushes of the weed. Proper timing of tillage before seeding, summer fallowing and the use of strongly competitive cereal crops in rotations may help to reduce populations of this weed (O'Donovan and Sharma 1987).

Chemical Control

Hemp-nettle cannot be controlled by 2,4-D. MCPA is is reported to be more active on the weed but results can be variable (O'Donovan and Sharma 1987). Local guidelines for the application of herbicides should be consulted for the most current control strategies.

References

Adam JW and Todd JM, 1974. (IN: O'Donovan and Sharma 1987) Observations on the relative occurrence of *Phoma exigua* var. *foveata* on weed hosts and potatoes. Potato Res. 17:349-350.

Bendixen LE Reynolds DA and Reidle RM, 1979. (IN: O'Donovan and Sharma 1987) An annotated bibliography of weeds as reservoirs for organisms affecting crops. 1. Nematodes. Ohio Agric. Res. Dev. Centre, Wooster, Ohio.

Conn JS Delapp JA, 1982. (O'Donovan and Sharma 1987) Weeds species shifts with increasing field age in Alaska. Weed Sci. 31:520-524.

Deschenes JM and Legere A, 1982. (IN: O'Donovan and Sharma 1987) Critical period of competition of hemp-nettle in alfalfa and oats. Res. Rep. Expert Comm. On Weeds (East Sect.).

Dew DA, 1979. (IN: O'Donovan and Sharma 1987) The effect of density of hemp-nettle on the yield of wheat. Res. Rep. Expert Comm. On Weeds (West Sect.).

Frankton C and Mulligan GA, (1987). Weeds of Canada. Publication 948, NC Press, Agriculture Canada.

Hanf M, 1983. The Arable Weeds of Europe with their seedlings and seeds. BASF United Kingdom Limited.

Hofsten CG von, 1947. Investigations of germination biology in some weed species. Vaxtodling (Uppsala). 2:91-107.

Holm LG, Pancho JV, Herberger JP, Plucknett DL, 1991. A Geographical Atlas of World Weeds. New York, USA: John Wiley and Sons.

Lauer E, 1953. (IN: O'Donovan and Sharma 1987) Uber dieKeimtemperatur von Ackerunkautern und deren Einfluss auf die Zussammensetzung von Unkrautgesellschaften. Flora Allg. Bot. Zeit. 140:551-595.

Macoun J, 1884. (IN: O'Donovan and Sharma 1987) Catalogue of Canadian plants. Part II. Gamopetalae> Dawson Brothers, Montreal, Que.

Muntzing A, 1930. (IN: O'Donovan and Sharma 1987) Outlines to a genetic monograph of the genus Galeopsis with special reference to the nature and inheritance of partial sterility. Hereditas 13:185-341.

O'Donovan JT, 1985. Influence of temperature on growth of hemp-nettle (*Galeopsis tetrahit* L.) and smartweed (*Polygonum lapathifolium* L.). Proc. North Centr. Weed Contr. Conf. 40:100.

O'Donovan JT Sharma MP, 1987. The Biology of Canadian Weeds. 80. *Galeopsis tetrahit* L.. Can. J. Plant Sci. 67:787-796.

Royer F, Dickinson R, 1999. Weeds of Canada and the Northern United States. University of Alberta Press and Lone Pine Press, Alberta, Canada.

Scragg EB McKelvie AD, 1976. (IN: O'Donovan and Sharma 1987) The effect of certain species of weeds on the grain yield of spring barley. Proc. Assoc. Appl. Biol. 83:335-338.

Solov'eva GI Krall EL and Vasil'eva AP, 1976. (IN: O'Donovan and Sharma 1987) The hemp-nettle cyst nematode *Heterodera galeopsidis* (Goffart 1936) in Karelia. Publ.: Petrozavodsk; Karrel'skii filial Akademii Naur USSR, Institute Biologii, 151-155.

Spurway CH, 1941. (IN: O'Donovan and Sharma 1987) Soil reaction (pH) preferences of plants. Michigan State College Agricultural Experiment Station, East Lansing, Mich.

Stelter H, 1979. (IN: O'Donovan and Sharma 1987) The occurrence of *Heterodera* species in areas of the GDR Archiv fur Phytopathologie and Pfan zenshutz. 15(b):429-432.

Thomas AG Wise RF, 1983. (IN: O'Donovan and Sharma 1987) Weed surveys of Saskatchewan cereal and oilseed crops from 1976 to 1979. Weed Survey Ser. Publ. 83-86. Agriculture Canada Research Station, Regina, Sask.

USDA, ARS, 2003. National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland. Available: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?16366

USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.