

Field Guide for Biological Control of Invasive Weeds and Insects in Nebraska Including Federal Noxious Weeds



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Kim A. Todd
2010



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Invasive Species are those species that are not native to the ecosystem and those whose introduction can cause economic or ecosystem harm as well as human health problems.

Introduction to Biological Control: Biological control is defined as “controlling pests by interfering with their ecological status, such as introduction of a natural enemy into the environment”.

This can sometimes be hard to get established because it is moving an organism to a new environment, but once established, it can be less labor intensive and more continual than other methods of control. Biological control can be used as part of an integrated pest management program to destroy the invasive plant tissues and cause stress to those plants for less competition.

Biological control is a good method to control invasive species because it will find the natural competitor that controls the species in its own native country and bring it to the new location where the invasive species are found. For an invasive species that is originally from Europe, a researcher will travel to that location in Europe where the invasive species grows naturally. They will then find the insect or disease that is host specific to control that invasive species and bring it back here to control the it in our country.

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Distribution Maps Key
(plants per acre) (insects per trap):

	0
	1-50
	51-500
	501-2000
	2001-4000
	4001 or more
	Found in Nebraska; no known population sizes

The distribution maps were created from surveys done by Weed County Superintendents in 2008. There was no data for Cedar and Butler counties for the noxious weeds and no data for Washington, Thurston, Saline, Otoe, McPherson, Lincoln, Hitchcock, Grant, and Gage counties for the watchlist weeds. For the counties that are shown in blue, the invasive species has been found, but the population size is unknown.

Garlic Mustard

Alliaria petiolata Bieb. Cavara and Grande
Brassicaceae

Forb

“Weeds of the Great Plains”-Nebraska Department of Agriculture



Tom Heutte, USDA Forest Service, Bugwood.org

USG1196039

Garlic Mustard

Alliaria petiolata Bieb. Cavara and Grande
Brassicaceae

Identification

- Height to 4 feet
- Small, 4-petaled, clustered, white flowers; April to June
- Arrowhead shaped leaves with irregularly toothed margins
- Leaves and stems smell like garlic when crushed
- Fruit is long pod, tan outside, black seeds inside

Habitat

- Mostly shady roadsides, fields, and forestry areas

Background, Uses, and Method of Spread

- Originally from Europe
- Is used as wildlife food and nectar for butterflies
- Spreads by seeds and the aid of wildlife and/or water

Impacts

- Competes with native vegetation by early growth
- Inhibits the growth of mycorrhizal fungi
- Can be lethal to butterfly larvae, a good pollinator

Management in Nebraska

- Burning and sanitation of boots, clothes, and tools
- Repeated manual removal, dry plants to avoid bloom
- Herbicide treatments can be used if necessary

Biological Control

- Five weevils and a beetle are being researched but no releases have been made
- *Ceutorhynchus scrobicollis* univoltine root mining weevil

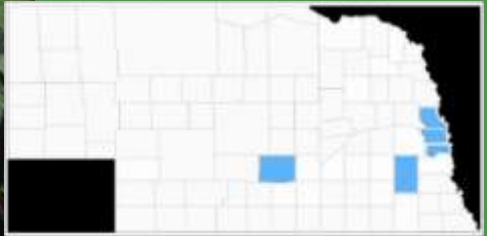
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Mock Strawberry

Duchesnea indica Sm.
Rosaceae

Forb

Ted Bodner, Southern Weed
Science Society, Bugwood.org



Richard Old, XID Services, Inc.,
Bugwood.org



Richard Old, XID Services, Inc.,
Bugwood.org



UGA5233036

Mock Strawberry

Duchesnea indica

Rosaceae

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Identification

- Height to 4 inches; spreads indefinitely
- Yellow, 5-petaled flowers with large green bracts; April to June
- Leaves have three leaflets with serrate blades
- Fruits are red and resemble a strawberry, inedible

Habitat

- Open woods and lawns, moist soils
- Fields, prairies, and waste areas

Background, Uses, and Method of Spread

- Originally from Asia
- Is used in the landscape as a groundcover
- Spreads by stolons

Impacts

- Rapidly spreads throughout lawns
- **Resembles strawberry, but isn't edible**
- Competes with native vegetation

Management in Nebraska

- Form a barrier around the plants
- Continual cultivation to keep plants from regrowing
- Herbicide treatments can be used if necessary

Biological Control

- Currently there are no biological control methods

Whitetop

Cardaria draba L.
Brassicaceae

Forb



"Weeds of the Great Plains"-Nebraska
Department of Agriculture



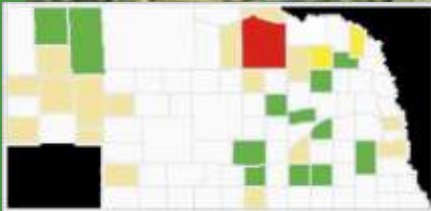
Pedro Tenorio-Lezama, Bugwood.org

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Pedro Tenorio-Lezama, Bugwood.org

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Whitetop

Cardaria draba L.
Brassicaceae

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Identification

- Also called hoary cress and pepperweed whitetop
- Height to 3 feet, usually around 1.5 feet
- 4-petaled, white umbels clustered terminally on a single stem; April to August
- Oblong leaves surround the stem, shallow dentation
- Heart-shaped, flat seed pods with brown seeds

Habitat

- Prairies, rangelands, and ditches, can be found in saline soils

Background, Uses, and Method of Spread

- Originally from Eurasia in ship ballast and contaminated seed
- Spreads by rhizomes and by water, hay, and equipment

Impacts

- Forms large masses of plantings
- Large rhizome system competes with native vegetation
- Foliage can be harmful to animals

Management in Nebraska

- Flooding for 2 months; repeated manual removal
- Herbicide treatments can be used, but not preferred

Biological Control

- Currently, these methods are still being studied
- *Ceutorhynchus cardariae* weevil; may work as a gall forming weevil and shows the most promise

Chinese Water spinach

Ipomoea aquatica Forssk.
Convolvulaceae

Forb

Division of Plant Industry Archive, Florida Department of
Agriculture and Consumer Services, Bugwood.org



5384121

Charles T. Bryson, USDA Agricultural
Research Service, Bugwood.org



058311-0340



Chinese Water spinach

Ipomoea aquatica Forssk.
Convolvulaceae

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Identification

- Spreads to 9 feet
- Purple, pink, or white funnel shaped flowers like petunias with a purple center; April to September
- Leaves are arrow shaped, 1-6 inches long
- Fruit is in a hairy capsule with 1-6 seeds

Habitat

- Is currently only found in California, Florida, and Hawaii
- Pond edges, muddy areas, stream banks

Background, Uses, and Method of Spread

- Originally from Asia
- Is used in the landscape and to control erosion
- Spreads by seeds, cuttings, and human transport

Impacts

- Blocks waterways and produces areas for mosquito reproduction
- People continue to import it as vegetable
- High production of biomass, can root at each node
- Competes with native vegetation

Management in Nebraska

- Can be harvested, but no parts can be released into the wild
- Repeated manual removal of all plant parts
- Herbicides can be used if necessary

Biological Control

- Currently there are no biological control methods

Saltcedar

Tamarisk ramosissima Ledeb.
Tamaricaceae

Trees
Shrubs

Timothy P. Miller-USDA APHIS PPQ

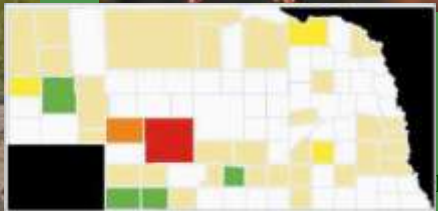


Timothy P. Miller-USDA
APHIS PPQ



Timothy P. Miller-USDA APHIS PPQ

Timothy P. Miller-USDA APHIS PPQ



Saltcedar

Tamarisk ramosissima L.
Tamaricaceae

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Identification

- Height to 20 feet; spread to 10 feet
- White to pink panicle flowers April to September
- Leaves are green scales, similar to a juniper
- Fruits are capsules containing many seeds

Habitat

- Salt marshes and flood plains
- Shore lines of lakes, rivers, and streams

Background, Uses, and Method of Spread

- Originally from Eurasia
- Used in the landscape and to control erosion
- Spreads by rhizomes and by wind/water dispersal

Impacts

- Pulls heavy amounts of water from soil; has long taproot
- Competes with native vegetation
- Pulls salt from the water and deposits it on soil
- Standing dry vegetation increases risk of fire

Management in Nebraska

- Burning or flooding
- Repeated manual removal

Biological Control

- *Diorhabda elongata* Saltcedar leaf beetle; feeds on salt cedar foliage and scrapes the bark; no longer permitted for U.S. use

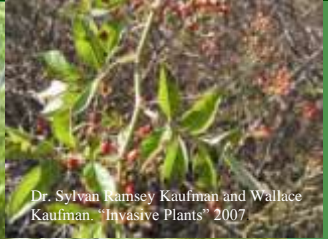
Multiflora Rose

Rosa multiflora Thunb.
Rosaceae

Trees
Shrubs



“Weeds of the Great Plains”-
Nebraska Department of
Agriculture

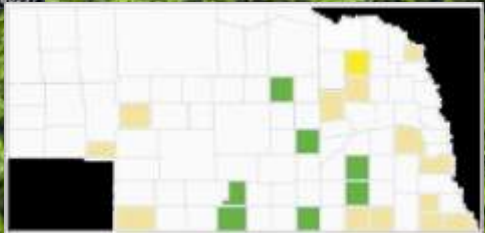


Dr. Sylvan Ramsey Kaufman and Wallace
Kaufman. “Invasive Plants” 2007



Chris Evans, River to River CWMA,
Bugwood.org

Dr. Sylvan Ramsey Kaufman and Wallace Kauf-
man. “Invasive Plants” 2007.



Multiflora Rose

Rosa multiflora Thunb.
Rosaceae

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Identification

- Height to 15 feet; spread to 13 feet
- White to pink flowers bloom in May or June
- 5-petaled flowers in clusters covering the plant
- Leaves are oblong and serrate with fringed petioles
- Fruit is a small, mostly round, hard red hip

Habitat

- Roadsides, fields, pastures and most soils; full sun to shade

Background, Uses, and Method of Spread

- Originally from Japan and Korea
- Used as a landscape ornamental and to control erosion
- Spreads by stolons or by seed with the aid of wildlife

Impacts

- 1 million seeds produced per plant; can be viable for 20 years
- Forms dense thickets no other plant can live within
- Provides habitat and winter food for wildlife

Management in Nebraska

- Burning in early spring
- Repeated manual removal, followed by herbicides
- Grazing by goats and cattle

Biological Control

- No biological control methods are currently available

Autumn Olive

Eleagnus umbellata Thunb.
Elaeagnaceae

Trees
Shrubs



Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.



Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.

NEBRASKAland Magazine/Nebraska Game and Parks Commission



Autumn Olive

Eleagnus umbellata Thunb.

Elaeagnaceae

Identification

- Height to 18 feet; spread to 18 feet
- Off-white to yellow clustered flowers of 2 or 3 May to June
- Elliptical leaves wider than Russian olive; covered with silvery pubescence
- Fruits are red, round to oblong, less than 1/2 inch

Habitat

- Flood plains, open forests and prairies; naturalized in pastures

Background, Uses, and Method of Spread

- Originally from Asia
- Used in the landscape as an ornamental
- Spreads by rhizomes and wildlife movement

Impacts

- Fixes nitrogen, causing a shift in the soil characteristics
- Thorny branches can be hazardous
- Fruits are a food source for wildlife
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Grazing by goats and sheep
- Cutting in late summer followed by herbicide application to reduce regrowth

Biological Control

- No biological control methods are currently available

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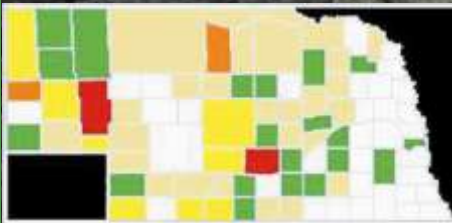
Russian Olive

Elaeagnus angustifolia L.
Elaeagnaceae

Trees
Shrubs



NEBRASKAland Magazine/Nebraska Game and Parks Commission



Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.

Russian Olive

Elaeagnus angustifolia L.
Elaeagnaceae

Identification

- Height to 30 feet; spread to 20 feet
- Off-white to yellow clustered flowers in 2's or 3's May to June
- Elliptical leaves are heavily pubescent; narrower than autumn olive
- Fruits are silver to olive-colored, round to oblong, less than 1/2 inch

Habitat

- Flood plains, open forests, meadows; naturalizes on roadsides

Background, Uses, and Method of Spread

- Originally from Eurasia
- Used in the landscape as an ornamental
- Spreads by rhizomes and by wildlife

Impacts

- Fixes nitrogen, causing a shift in the soil characteristics
- Thorny branches can be hazardous
- Fruits are a food source for wildlife
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Cutting in late summer followed by herbicide application to reduce regrowth

Biological Control

- No biological control methods are currently available

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European Buckthorn

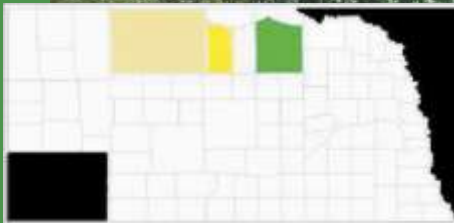
Rhamnus cathartica L.
Rhamnaceae

Trees
Shrubs



"Weeds of the Great Plains"-Nebraska
Department of Agriculture

"Weeds of the Great Plains"-Nebraska Department of Agriculture



"Weeds of the Great Plains"-Nebraska
Department of Agriculture

European Buckthorn

Rhamnus cathartica L.
Rhamnaceae

Trees
Shrubs

Identification

- Also called common buckthorn
- Height to 25 feet; spread to 20 feet
- Small, 4-petaled, yellow to brown flowers in leaf axils; May to July
- Leaves are oblong, margins are wavy with small teeth
- Fruits are black, round, and persistent
- Bark has obvious, white lenticels

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Habitat

- Woodlands, prairies, and fields; well-drained soils are preferred

Background, Uses, and Method of Spread

- Originally from Europe
- Used in the landscape and as fences
- Spreads by rhizomes and wildlife

Impacts

- Alternate host for oat rust
- Fruits persist into winter for wildlife food and habitat
- Forms thickets with thorns which can be hazardous
- Competes with native vegetation

Management in Nebraska

- Burning
- Manual removal followed by herbicide treatment of the stumps
- Plant open areas to limit invasion

Biological Control

- No biological control methods are currently available

Houndstongue

Cynoglossum officinale L.
Boraginaceae

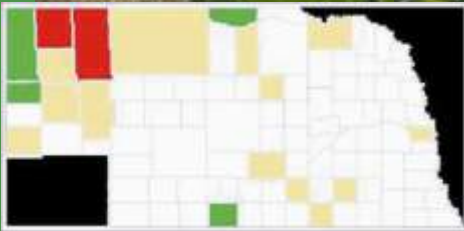
Forb



Richard Old, XID Services, Inc., Bugwood.org



Mary Ellen (Mel) Harte, Bugwood.org



"Weeds of the Great Plains"-Nebraska
Department of Agriculture

Houndstongue

Cynoglossum officinale L.
Boraginaceae

Identification

- Height to 3 feet
- Pinkish-purple 5-petaled clustered flowers; May to July
- Pointy pubescent leaves are smaller at the top
- Prickly nut, flat on top, holds one small seed

Habitat

- Roadsides, pastures, and meadows; Prefers disturbed areas

Background, Uses, and Method of Spread

- Originally from Europe
- Used as a medicinal herb
- Spreads by seed with the aid of animals and wind

Impacts

- Can cause skin irritation or possibly cancer in humans
- Gets caught in animal fur, reducing the value of the pelt
- Can be poisonous to animals
- Has a very long taproot to collect deep water
- Competes with native vegetation

Management in Nebraska

- Maintain healthy native plant populations
- Herbicide treatments can be used after repeated manual removal to reduce regrowth

Biological Control

- Currently, these methods are still being studied
- *Mogulones borraginis* seed feeding weevil; feed on seed, non-permitted, non-specific organism for control

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Sulphur Cinquefoil

Potentilla recta L.
Rosaceae

Forb

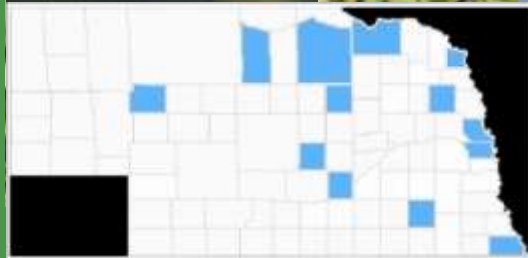
"Weeds of the Great Plains"-Nebraska Department of Agriculture



"Weeds of the Great Plains"-Nebraska
Department of Agriculture



Richard Old, XID Services, Inc.,
Bugwood.org



Sulphur Cinquefoil

Potentilla recta L.

Rosaceae

Identification

- Height to 3 feet
- Whitish-yellow, 5-petaled flowers with a brighter yellow center, each petal is deeply indented; May to July
- Small gray-green leaves are toothed and palmately compound, 5 leaflets
- Kidney-shaped seed, reddish-purple, slightly winged

Habitat

- Pastures, roadsides, open fields and waste areas

Background, Uses, and Method of Spread

- Originally from Europe
- Used in pastures and for herbal teas
- Spreads by rhizomes and seeds

Impacts

- Vigorous growth rate due to persistent fibrous root system
- Can self pollinate
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal, mowing is not an effective method
- Repeated cultivation
- Herbicides can be used if necessary
- Grazing by sheep and deer

Biological Control

- Currently there are no biological control methods

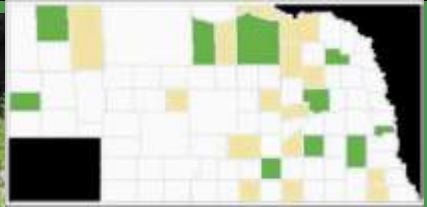
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Crown Vetch

Coronilla varia L.
Fabaceae

Forb

Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.



Beverly Turner, Jackson
Minnesota, Bugwood.org



NEBRASKAland Magazine/Nebraska Game
and Parks Commission

Crown Vetch

Coronilla varia L.
Fabaceae

Identification

- Height to 1 foot
- White and pink to purple flowers similar to peas, arranged in rounded clusters; May to August
- Leaves are compound with 15-25 oval leaflets
- Fruit is a 2 inch long pod with 3-12 brown seeds in each

Habitat

- Open areas, ditches, streambanks and roadsides

Background, Uses, and Method of Spread

- Originally from Europe, Asia, or Africa
- Used as a groundcover or to control erosion
- Spreads by rhizomes and seed, which stays viable for many years

Impacts

- Fixes nitrogen, causing a shift in the soil characteristics
- Toxic to horses
- Can be spread by wildlife
- Competes with native vegetation

Management in Nebraska

- Burning and repeated manual removal
- Mowing in late spring and late summer
- Covering with black plastic during the growing season
- Herbicide treatments in late spring can be effective

Biological Control

- No biological control methods are currently available

- | | |
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| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Dame's Rocket

Hesperis matronalis L.
Brassicaceae

Forb



Mark Frey, The Presidio Trust
Bugwood.org

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Game and Parks Commission



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Dame's Rocket

Hesperis matronalis L.

Brassicaceae

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Identification

- Biennial plant reaching a height of 4 feet
- Purple or white, clustered raceme flowers, each with 4 petals; May to August
- Leaves have small teeth on the margin and a pointed tip
- Fruit is in a 2-capsuled pod up to 1/2 foot long

Habitat

- Roadside ditches, sometimes found in shady areas
- Areas along streams and floodplains; abandoned farmsteads

Background, Uses, and Method of Spread

- Originally from Eurasia
- Used in the landscape, included in wildflower mixes
- Spreads by seed that remains viable for many years

Impacts

- An alternate host for many plant viruses
- Spreads rapidly due to inclusion in seed mixes
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Disposal of seed heads; do not compost
- Herbicide treatments can be used in late fall

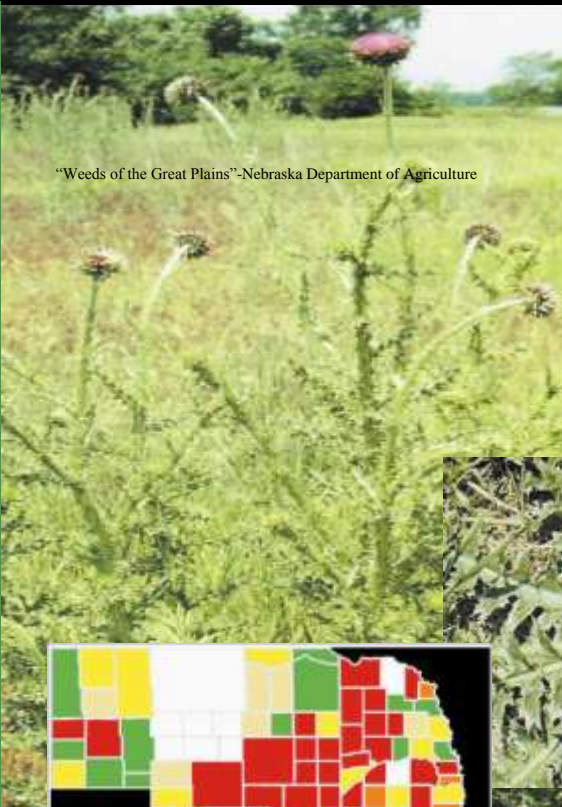
Biological Control

- No biological control methods are currently available

Musk Thistle

Carduus nutans L.
Asteraceae

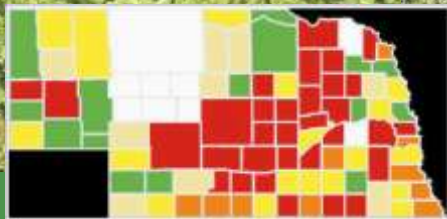
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"Weeds of the Great Plains"-Nebraska Department of Agriculture



NEBRASKAland Magazine/
Nebraska Game and Parks
Commission



Above: "Weeds of the Great Plains"-
Nebraska Department of Agriculture

Musk Thistle

Carduus nutans L.
Asteraceae

Identification

- Also called nodding thistle
- Height to 10 feet; rosette first year
- Nodding terminal compound pink-purple flowers May to August
- Lobed, serrate leaves; serration shallower than plumeless thistle, spines at the end of each lobe, the tip spine is white
- Yellow to brown achene fruits, one edge curved

Habitat

- Rangelands and open woodlands

Background, Uses and Method of Spread

- Originally from Eurasia and North Africa
- Wind, water, and wildlife spread seeds

Impacts

- Prolific seed production
- Forms dense colonies which reduces yield in forage crops
- Competes with native vegetation

Management in Nebraska

- Maintain healthy desirable plants and good soil fertility
- Manual removal, including grazing by cattle and goats; sanitation

Biological Control

- *Cheilosia corydon*, flower fly; larvae feed in stems
- *Psylliodes chalconera*, flea beetle; feeds on rosettes and stalk buds
- *Trichosirocalus horridus*, rosette weevil; feeds on rosettes
- *Urophora solstitialis*, gall fly; larvae feed on flowers

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| <input checked="" type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Leafy Spurge

Euphorbia esula L.
Euphorbiaceae

Forb



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Nebraska Department of Agriculture



Leafy Spurge

Euphorbia esula L.
Euphorbiaceae

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| <input type="checkbox"/> | Federal Noxious Weed |
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Identification

- Height to 3 feet, usually 1-2 feet
- Green to yellow bracts surround non-showy umbel flowers, Stems contain a white, milky substance; May to September
- Leaves are oblong with one noteworthy vein
- 3 lobed capsule fruits

Habitat

- Cropland, woodlands, shelter belts, rangeland, and roadsides

Background, Uses, and Method of Spread

- Originally from Eurasia
- Spreads by seeds and adventitious shoots from crown and roots

Impacts

- Costs millions of dollars annually due to lost production
- Considered toxic to cattle but not to goats
- Establishes quickly and easily
- Competes with native vegetation

Management in Nebraska

- Grazing and burning
- Repeated manual removal

Biological Control

- Many insects but mostly different kinds of flea beetles
- *Aphthona abdominalis*, *A. cyparissiae*, *A. czwalinae*, *A. flava*, and more
- Adults feed on leaves and flowers, larvae feed on roots

Common Crupina

Crupina vulgaris Cass.
Asteraceae

Forb



USDA APHIS PPQ Archive, USDA APHIS PPQ, Bugwood.org



Joseph M. DiTomaso, University of California - Davis, Bugwood.org



Julia Scheer, USDA APHIS PPQ, Bugwood.org



37

Common Crupina

Crupina vulgaris Cass.
Asteraceae

Identification

- Winter annual plant
- Height to 4 feet; rosette first year
- Pink to purple flowers 1/2 inch long with spiked petals; June to July
- Fruit is a dark seed with hairs at point of attachment
- Leaves are gradually more serrate toward the top of the plant and entire at the base
- Cotyledons have a red-purple midrib

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| <input type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Habitat

- Can survive many different conditions
- Roadsides, rangeland, and forested areas

Background, Uses, and Method of Spread

- Originally from Eurasia
- Spreads by seed with the aid of wildlife and water

Impacts

- Forms dense colonies that reduces cattle grazing areas
- Competes with native vegetation

Management in Nebraska

- Quarantining cattle for 6 days prior to new field entry to reduce the spread of the seeds that could be carried by the cattle
- Manual hand removal; herbicides can be used
- Maintain a healthy desirable plant population of desired plants

Biological Control

- Currently there are no biological control methods

Goatsrue

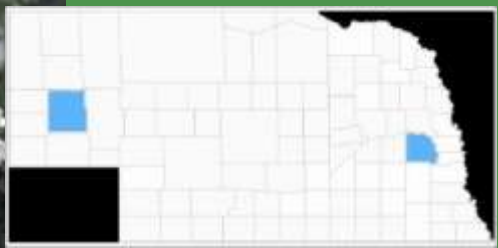
Galega officinalis L.
Fabaceae

Trees
Shrubs

Steve Dewey, Utah State University, Bugwood.org



UGA1459186



USDA APHIS PPQ Archive, USDA
APHIS PPQ, Bugwood.org

UGA1148056

Goatsrue

Galega officinalis L.
Fabaceae

Identification

- Height to 6 feet
- Purple to white terminal raceme flowers; June to July
- Leaves are pinnately compound, with 6-10 small leaflets with a spine at the tip
- Stems are hollow and round
- Fruit is in a pod that contains 9 seeds

Habitat

- Shore lines of streams, low pastures and ditches

Background, Uses, and Method of Spread

- Originally from the middle east for livestock grazing
- Seed distributed by wildlife, wind, and equipment

Impacts

- Prolific seed production; viable for up to 10 years
- Forms dense colonies that deter livestock movement
- Is toxic to sheep
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Use row crops and alternate crops planted each year to interrupt the lifecycle
- Removal of crowns after herbicide treatment

Biological Control

- Currently there are no biological control methods

<input checked="" type="checkbox"/>	Federal Noxious Weed
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<input type="checkbox"/>	Watchlist Weed

Canada Thistle

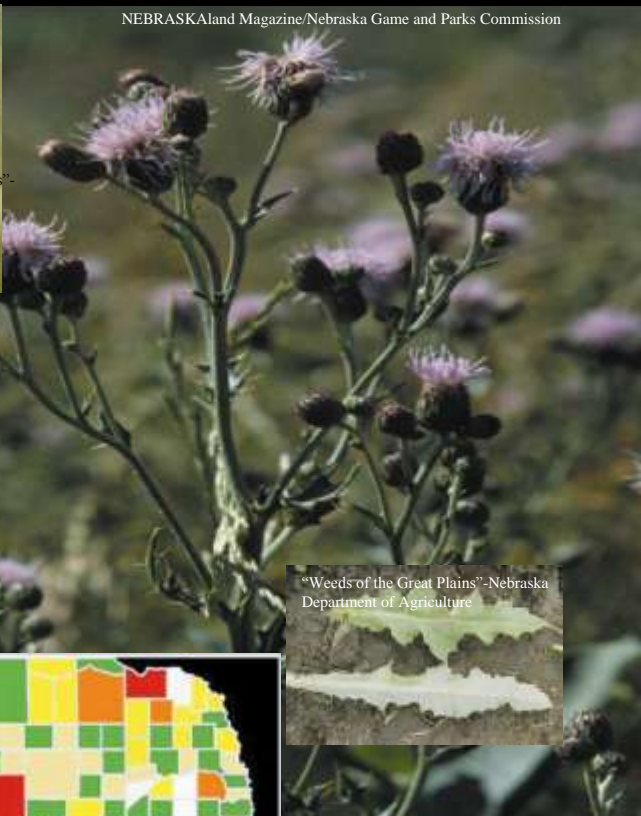
Cirsium arvense L. Scop.
Asteraceae

Forb

NEBRASKAland Magazine/Nebraska Game and Parks Commission



"Weeds of the Great Plains"-
Nebraska Department of
Agriculture



"Weeds of the Great Plains"-Nebraska
Department of Agriculture



Canada Thistle

Cirsium arvense L. Scop.
Asteraceae

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input checked="" type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Identification

- Height to 4 feet; rosette first year up to 18 inches wide
- Compound pink to purple flowers in clusters; smaller than other thistles; June to August
- Foliage irregularly and sharply lobed; margins with short spines
- Fruit is a tan, flat achene

Habitat

- Rangeland, cropland, roadsides, and edges of waterways

Background, Uses and Method of Dispersal

- Originally from Eurasia and North Africa
- Spreads up to 1/2 mile by wind, water, and wildlife; Also as a seed contaminant

Impacts

- Multi-million dollar losses in crop production due to competition
- Releases toxic substances into the soil which inhibits growth of some plants
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal; Cultivation every 10 days for 2 years
- Maintenance of forage grasses to cover open soil

Biological Control

- *Ceutorhynchus litura*, stem weevil; wounds for pathogen entry
- *Trichosiocalus horridus*, crown weevil; alters growth
- *Urophora cardui*, stem gall fly; decreases plant vigor

Caucasian Bluestem

Bothriochloa bladhii Ledeb.
Poaceae

Grass

Jose Hernandez @ USDA-NRCS PLANTS Database



Jose Hernandez @ USDA-NRCS PLANTS Database



Larry Allain USGS NWRC @ USDA-NRCS PLANTS Database



Caucasian Bluestem

Bothriochloa bladhii Ledeb.

Poaceae

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Identification

- Also called Australian bluestem and Australian beardgrass
- Height to 2-3 feet tall
- Green to purple, long, thin panicle flowers; June to August
- Leaves are flat or bent outward, smooth, with a noticeable midrib
- When crushed, the leaves smell like turpentine

Habitat

- Roadsides and pastures; prefers heavy, dry soils

Background, Uses, and Method of Spread

- Originally from Eurasia
- Used in the landscape and as a pasture forage
- Spreads by rhizomes and by seed

Impacts

- Establishes easier than the native bluestems
- Increases risk of wildfire due to standing dry vegetation
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal during seedling stage
- Grazing by cattle
- Herbicides may be used if necessary

Biological Control

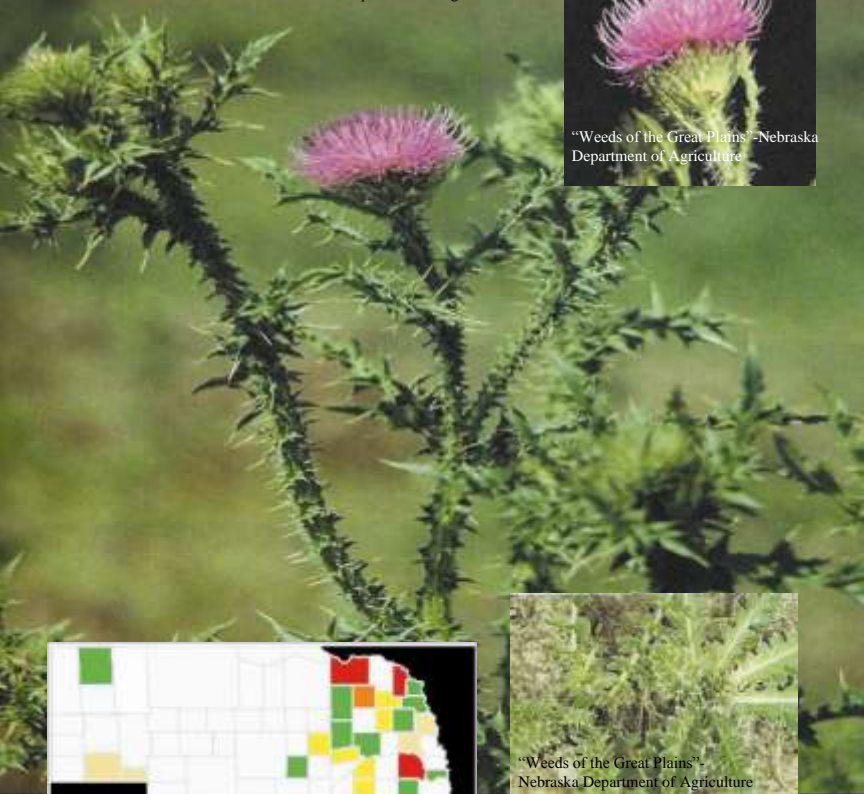
- Currently there are no biological control methods

Plumeless Thistle

Carduus acanthoides L.
Asteraceae

Forb

"Weeds of the Great Plains"-Nebraska Department of Agriculture



"Weeds of the Great Plains"-Nebraska Department of Agriculture



"Weeds of the Great Plains"-
Nebraska Department of Agriculture

Plumeless Thistle

Carduus acanthoides L.

Asteraceae

Identification

- Height to 4 feet; rosette first year
- Purple clustered or solitary compound flowers; June to August
- Stem is spiny and winged to the flower, unlike musk thistle which has a spineless stem area
- Leaves are elliptical, pinnatifid, and spiny
- Almost square fruit with hairs forming a ring at the tip

Habitat

- Pastures, rangeland, non-crop areas, and roadsides

Background, Uses, and Method of Spread

- Originally from Eurasia
- It is a food source for butterflies and songbirds
- Spreads by wind-driven seed distribution

Impacts

- Thousands of dollars lost in NE agricultural production annually
- Competes with native vegetation

Management in Nebraska

- Maintain healthy desirable plants
- Repeated manual removal

Biological Control

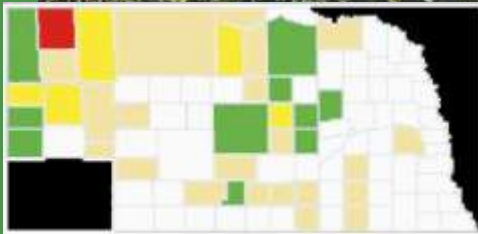
- *Cheilosia corydon* flower fly; larvae feed in stem
- *Psylliodes chalconera* flea beetle; feed on rosette leaves and buds
- *Trichosirocalus horridus* rosette weevil; feeds on rosettes

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input checked="" type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Scotch Thistle

Onopordum acanthium L.
Asteraceae

Forb



Scotch Thistle

Onopordum acanthium L.
Asteraceae

- | | |
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| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Identification

- Height to 10 feet; rosette first year
- Rose to purple, paired, terminal compound flowers with spines along the base; June to August
- Large, winged stems hold lobed leaves with yellow spines
- Achene fruits are wrinkled with 4 angles

Habitat

- Dry, western Nebraska sites
- Roadsides; river and creek banks

Background, Uses, and Method of Spread

- Originally from Eurasia as a landscape plant
- Spreads by wind/water dispersal

Impacts

- Produces thick stands that inhibit wildlife movement
- Spines are hazardous to wildlife
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal; goats will graze
- Mowing before flowers are formed in the second year
- Herbicides can be used if necessary

Biological Control

- *Lixus cardui* thistle stem borer weevil, is being studied for host specificity

St. John's Wort

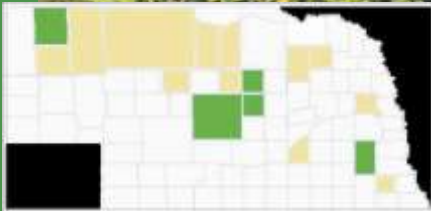
Hypericum perforatum L.
Clusiaceae (Hypericaceae)

Trees
Shrubs



"Weeds of the Great Plains"-
Nebraska Department of Agriculture

"Weeds of the Great Plains"-Nebraska Department of Agriculture



"Weeds of the Great Plains"-Nebraska
Department of Agriculture

St. John's Wort

Hypericum perforatum L.
Clusiaceae (Hypericaceae)

Identification

- Also called Klamath weed
- Height to 5 feet, usually closer to 2 feet
- Five-petaled yellow flowers with black dots; June to August
- Leaves are oblong and have translucent dots
- Shiny brown dehiscent 3-lobed capsules contain seeds

Habitat

- Fields, forest edges, and pastures
- Sunny areas that are well-drained, prefers sandy soils

Background, Uses, and Method of Spread

- Originally from Europe for landscape use
- Used as a remedy for depression
- Seeds spread by animals, wind, and water; colonizes by rhizomes and stolons

Impacts

- A single plant can produce 15,000-30,000 seeds; also forms dense colonies
- Can be toxic to livestock
- Competes with native vegetation

Management in Nebraska

- Summer application of herbicides
- Burning and repeated manual removal or regular tillage

Biological Control

- *Chrysolina quadrigemina* **St. John's Wort beetle**; feeds on leaves
- *Agrilus hyperici* root borer; larvae feed on stem and roots

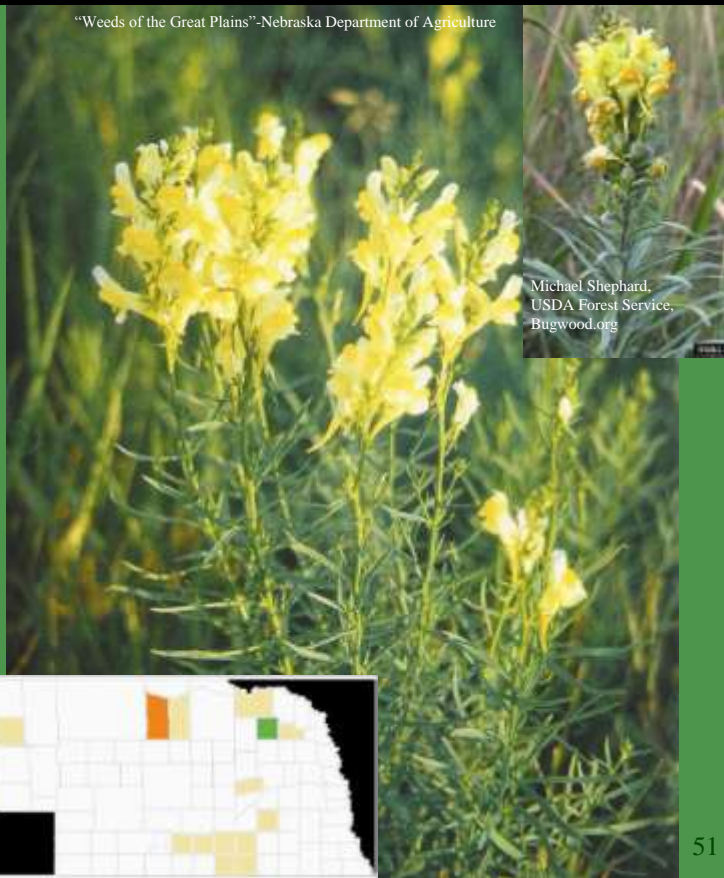
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| <input checked="" type="checkbox"/> Watchlist Weed |

Yellow Toadflax

Linaria vulgaris P. Miller
Scrophulariaceae

Forb

"Weeds of the Great Plains"-Nebraska Department of Agriculture



Michael Shephard,
USDA Forest Service,
Bugwood.org

Yellow Toadflax

Linaria vulgaris P. Miller
Scrophulariaceae

Identification

- Height to 3 feet
- Tubular yellow flowers with orange throats in racemes; June to August

- Thin, oblong leaves with a pointed tip
- Fruit is a round, 2-celled capsule

Habitat

- Rangelands, grain fields, and roadsides

Background, Uses, and Method of Spread

- Originally from Eurasia
- Used in the landscape; spreads by extensive rhizomes

Impacts

- Can be slightly poisonous to livestock
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Maintain healthy desirable plant populations
- Herbicide treatment can be used at high rates

Biological Control

- *Eteobalea serratella* and *E. intermediella* root-boring moths; larvae feed on roots
- *Brachyterolus pulicarius* Toadflax flower-eating beetle; adults feed on shoot tips and larvae feed on reproductive parts
- *Gymnetron antirrhini* capsule weevil; larvae feed on seeds
- *Mecinus janthinus* stem-boring weevil; larvae mine into stems

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| <input type="checkbox"/> | Federal Noxious Weed |
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| <input checked="" type="checkbox"/> | Watchlist Weed |

Diffuse Knapweed

Centaurea diffusa Lam.

Asteraceae

Forb



Richard Old, XID Services, Inc., Bugwood.org



"Weeds of the Great Plains"-Nebraska
Department of Agriculture



K. George Beck and James Sebastian, Colorado
State University, Bugwood.org



K. George Beck and James Sebastian,
Colorado State University, Bugwood.org

Diffuse Knapweed

Centaurea diffusa Lam.
Asteraceae

Identification

- Height to 4 feet; rosette first year
- Finely dissected compound white flowers; can be pink to purple; June to September
- Yellow to brown bracts surround the flowers
- Leaves are small and elliptical
- Long brown achene fruits with hairs on one end

Habitat

- Rangeland, meadows, roadsides, and sandy soils

Background, Uses, and Method of Spread

- Came from Eurasia in contaminated alfalfa and ship ballast
- Spreads by seeds through water or animal movement

Impacts

- Allelopathic chemicals released that affect other plants
- Establishes readily on disturbed ground
- Decreases forage production for livestock

Management in Nebraska

- Maintain healthy desirable plants for competition
- Mowing soon after flowering, before seeds mature
- Grazing by sheep and goats and repeated manual removal

Biological Control

- *Bangasternus fausti* weevil; larvae eat entire seed head
- *Larinus minutes* flower weevil; larvae feed on seeds
- *Pelochrista medullana*, *Pterolonche inspersa* root moths

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Perennial Pepperweed

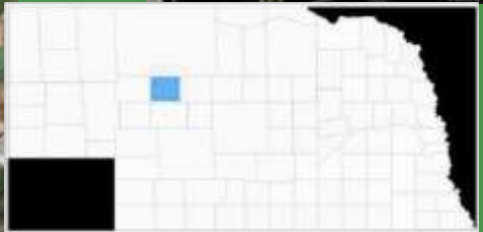
Lepidium latifolium L.
Brassicaceae

Forb

Steve Dewey, Utah State University, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Joseph M. DiTomaso, University of California - Davis, Bugwood.org

5374988

Perennial Pepperweed

Lepidium latifolium L.
Brassicaceae

Identification

- Also called tall whitetop
- Height to 5 feet
- White flowers with 4 petals; flat clusters at the tip of each stem; June to September
- Leaves are grayish, small, and oblong

Habitat

- Riverbanks, floodplains, and marshes
- Meadows, rangelands, and roadsides

Background, Uses, and Method of Spread

- Originally from Eurasia with other seed
- Used as a cut flower
- Spread by agricultural equipment, wildlife, and humans

Impacts

- Brings salt from deep in the soil to the surface
- Grows into dense colonies which reduces habitat for wildlife
- Competes with native vegetation

Management in Nebraska

- Sanitation of agriculture equipment
- Repeated manual removal followed by herbicide treatment
- Long-term flooding

Biological Control

- *Ceutorhynchus marginellus* gall forming beetle, *Phyllotreta reitteri* shot mining flea beetle, and *Metaculus lepidifolii* gall forming mite are being tested

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| <input checked="" type="checkbox"/> | Watchlist Weed |

Spotted Knapweed

Centaurea biebersteinii Lam.
Asteraceae

Forb



Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.

Dr. Sylvan Ramsey Kaufman and
Wallace Kaufman. "Invasive Plants"

Spotted Knapweed

Centaurea biebersteinii DC.

(Formerly known as *Centaurea maculosa*)

Asteraceae

Identification

- Height to 4 feet; rosette first year
- Pink to purple finely dissected compound daisy flowers with black fringe; June to September
- Yellow to brown bracts beneath flowers
- Leaves are small, elliptical, and slightly pinnate
- Fruits, notched on side, with a tuft of hair at the base

Habitat

- Rangeland, roadsides, and disturbed, open areas

Background, Uses, and Method of Spread

- Originally from Eurasia in contaminated seed and ship ballast
- Seeds are spread by water or animal movement

Impacts

- Allelopathic chemicals affect other plants
- Establishes readily on disturbed ground
- Decreases forage production for livestock

Management in Nebraska

- Mowing soon after flowering, before seeds mature
- Grazing by sheep and goats and repeated manual removal

Biological Control

- *Bangasternus fausti* weevil; larvae eat entire seed head
- *Agapeta zoegana* root moth; larvae feed on the roots
- *Chaetorellia acrolophi* fly; larvae feed on the flower

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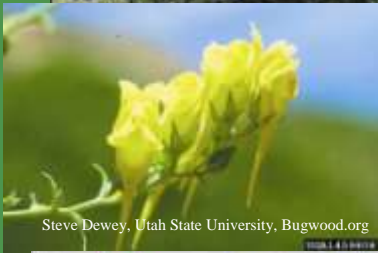
Dalmation Toadflax

Linaria dalmatica L.
Scrophulariaceae

Forb



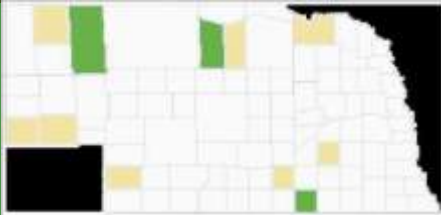
Linda Wilson, University of Idaho, Bugwood.org



Steve Dewey, Utah State University, Bugwood.org



09A1416005



Dalmation Toadflax

Linaria dalmatica L.
Scrophulariaceae

Identification

- Height to 3 feet
- Tubular yellow flowers with orange throats in racemes; July to August
- Heartshaped leaves, larger than yellow toadflax
- Fruit is a round, 2-celled capsule

Habitat

- Grasslands, woodlands, and roadsides

Background, Uses, and Method of Spread

- Originally from the Mediterranean
- Used in the landscape and spreads by rhizomes

Impacts

- Once established, there are few effective control methods
- Very aggressive rhizomes produce large colonies
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal
- Maintain healthy desirable plant populations
- Herbicide treatment can be used at high rates in accordance with label directions

Biological Control

- *Mecinus janthinus* stem-boring weevil; larvae mine into stems
- *Calophasia lunula* toadflax moth; larvae feed on new shoots
- *Gymnetron linariae* root-galling weevil; adults feed on shoots and larvae form galls on the roots and rhizomes

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Amur Honeysuckle

Lonicera maackii (Rupr.) Maxim.
Caprifoliaceae

Trees
Shrubs



James H. Miller, USDA Forest Service, Bugwood.org



Chuck Barger, University of Georgia, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Amur Honeysuckle

Lonicera maackii (Rupr.) Maxim.
Caprifoliaceae

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| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Identification

- Height to 18 feet; spread to 15 feet
- White, paired flowers from the leaf axil; July to September
- Leaves are hairy, elliptical, and come to a narrow point
- Fruits are small, round, and red

Habitat

- Full to part sun environments
- Pastures, roadsides, forest edges, home landscapes

Background, Uses, and Method of Spread

- Originally from Asia
- Is used in the landscape
- Spreads by seeds and wildlife dispersal

Impacts

- Prolific seed production which is spread by birds
- Greens up sooner in the spring giving it an advantage
- Competes with native vegetation

Management in Nebraska

- Manual removal followed by herbicide treatment or grinding the stump
- Burning in the spring
- Maintain a healthy desirable plant environment
- Herbicide treatments can be used

Biological Control

- No biological control methods are currently available

Broomrape

Orobanche ramosa L.
Orobanchaceae

Parasitic
Plant

USDA APHIS PPQ Archive, USDA APHIS PPQ, Bugwood.org



USDA APHIS PPQ Archive,
USDA APHIS PPQ, Bug-



USDA APHIS PPQ Archive, USDA
APHIS PPQ, Bugwood.org



Broomrape

Orobanche ramosa L.
Orobanchaceae

Identification

- Plants lacks chlorophyll
- Height to 2 feet
- Violet tubular flowers with white throats; July to September
- Leaves are brown, triangular, and scale like
- Fruit is a capsule with seeds contained in sepals

Habitat

- Open fields and roadsides, on host plants, mostly broadleaf

Background, Uses, and Method of Spread

- Originally from Europe
- Was introduced accidentally
- Spreads by equipment, wildlife, wind, and water

Impacts

- Prolific seed production; up to 50,000 seeds from one plant
- Seeds remain viable for up to 12 years
- Severely damages the host plant
- Competes with native vegetation

Management in Nebraska

- Sanitization of equipment
- Repeated manual removal and burning
- Rotation to non-host plants

Biological Control

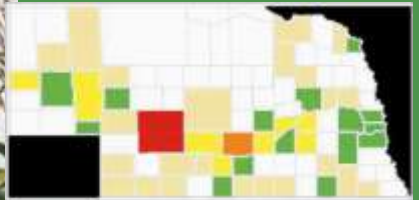
- Currently, no biological controls are host specific for use in the United States, more research is being done

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| <input type="checkbox"/> | Watchlist Weed |

Phragmites

Phragmites australis (Cav.) Trin, ex Steud.
Poaceae

Grass



Phragmites

Phragmites australis (Cav.) Trin, ex Steud.
Poaceae

Identification

- Also called common reed grass
- Height to 20 feet; indefinite spread
- Large dense panicle seedheads on top of stems; July through September
- Yellow-green leaves contrast with gray-green foliage of many native grasses
- Rough stems that do not turn purple; no bend at stem nodes

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| <input checked="" type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Habitat

- Marshes, floodplains, ditches, ponds, waterways

Background, Uses, and Method of Spread

- Originally from Europe
- Used for bank stabilization and as forage for cattle
- Spreads by extensive rhizomes and seed dispersal

Impacts

- Disrupts the flow of water in streams and channels
- Increases risk of wildfire due to standing vegetation
- Competes with native vegetation

Management in Nebraska

- Burning and flooding
- Repeated manual removal including grazing
- Diking
- Herbicide sprays can be beneficial if needed

Biological Control

- Research is being completed to find a host specific control

Purple Loosestrife

Lythrum salicaria L.
Lythraceae

Forb

Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.



Dr. Sylvan Ramsey Kaufman and Wallace Kaufman. "Invasive Plants" 2007.

Purple Loosestrife

Lythrum salicaria L.
Lythraceae

Identification

- Height to 8 feet; spread to 5 feet
- Pink to purple spiked flowers bloom from July to September
- Leaves are heart-shaped and pointed at apex
- Capsule fruits have 2 lobes and many seeds

Habitat

- Marshes, river and creek banks, ditches, and wet meadows
- Can withstand flooding up to 18 inches deep

Background, Uses, and Method of Spread

- Originally from Europe
- Used as an herb, a nectar source for bees, and in landscapes
- Leaf size changes to obtain largest amount of light; competing with other plants
- Huge seed production, viable for 20 years

Impacts

- Adapts to many environments
- Reproduces from broken stems
- Competes with native vegetation

Management in Nebraska

- Repeated manual removal before reproduction, prevent seed set

Biological Control

- *Galerucella californiensis* and *G. pusilla* loosestrife beetles; adults and larvae feed on buds and leaves
- *Hylobius transversovittatus* loosestrife root weevil; adults feed on foliage, larvae feed on roots

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Dodder

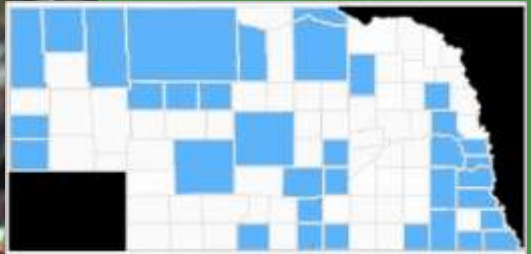
Cuscuta spp.
Cuscutaceae

Parasitic
Plant

John D. Byrd, Mississippi State University, Bugwood.org



UGA1391270



Charles T. Bryson, USDA Agricultural
Research Service, Bugwood.org

950911A00

Dodder

Cuscuta spp.
Cuscutaceae

Identification

- Plants lack chlorophyll
- Spread to 6.5 feet
- White, 4 or 5-petaled, corolla flowers; July to October
- Leaves are inconspicuous scales
- Fruit is a round capsule with 2 cells, 4 seeds

Habitat

- Moist ground, thickets, and growing on other plants

Background, Uses, and Method of Spread

- Many different species; many are native
- Does not need roots in soil; uses host plants for all nutrients
- Spreads by seeds

Impacts

- Vectors diseases that can be destructive to agricultural plants
- Feeds on native vegetation
- Nectar and pollen are toxic to bees
- Can cause health problems in horses and cattle

Management in Nebraska

- Repeated manual removal before flowering
- Remove host plant parts that are colonized by dodder
- Herbicide treatments can be used if necessary
- Ducks feed on the seed

Biological Control

- Some diseases infect dodder, but are difficult to culture and apply, and are not available commercially

- | | |
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| <input checked="" type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Sericea Lespedeza

Lespedeza cuneata (Dum.-Cours.) G. Don
Fabaceae

Forb

"Weeds of the Great Plains"-Nebraska Department of Agriculture

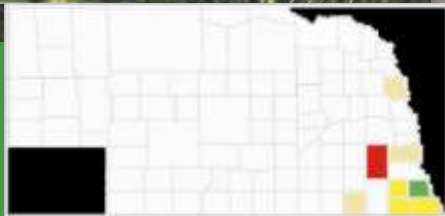


"Weeds of the Great Plains"-
Nebraska Department of
Agriculture



Chris Evans, River to River
CWMA, Bugwood.org

UNGA1300



Sericea Lespedeza

Lespedeza cuneata (Dum.-Cours.) G. Don
Fabaceae

- | | |
|-------------------------------------|----------------------|
| <input type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input checked="" type="checkbox"/> | Watchlist Weed |

Identification

- Also called Chinese lespedeza and Chinese bushclover
- Height to 5 feet
- White to yellow 5-petaled pealike flowers in a spike with purple or pink veins, in groups of 2-4; July to October
- 3 leaflets that are oblong and pointed
- Fruit is a one-seeded pod with slight pubescence

Habitat

- Grasslands and roadsides; shore lines, streams, and thickets

Background, Uses, and Method of Spread

- Introduced from Asia for bank stabilization and forage
- Wildlife movement spreads seeds; contained in grass seed mixes

Impacts

- Seeds remain viable for up to 20 years
- Contain dyes that reduce forage value
- Competes with native vegetation

Management in Nebraska

- Burning in late spring after fertilization
- Repeated manual removal; grazing by goats and cattle
- Herbicides may be used if necessary, by mid-summer

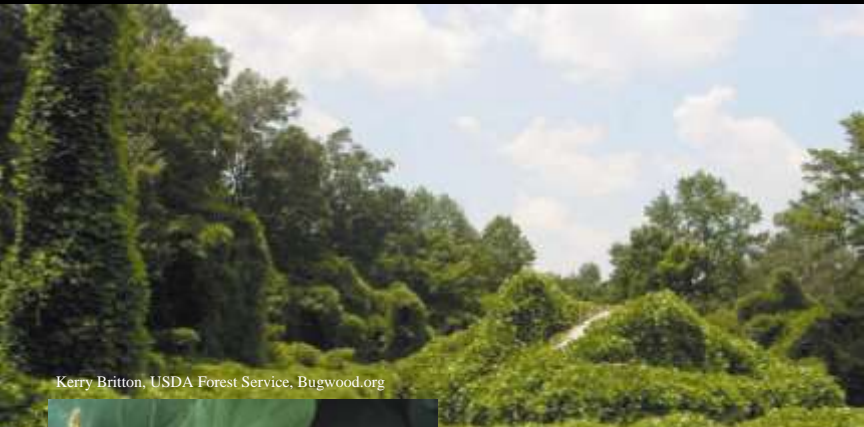
Biological Control

- Currently there are no biological control methods

Kudzu

Pueraria montana (Lour.) Merr.
Fabaceae

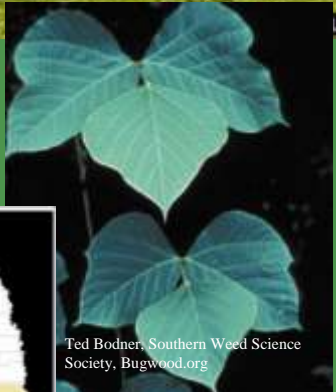
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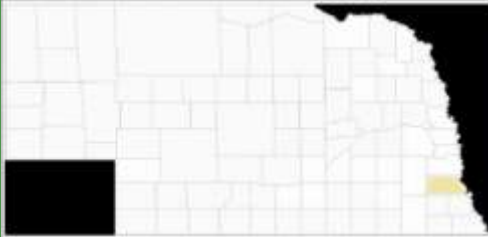
Kerry Britton, USDA Forest Service, Bugwood.org



David J. Moorhead, University of Georgia, Bugwood.org



Ted Bodner, Southern Weed Science Society, Bugwood.org



Kudzu

Pueraria montana (Lour.) Merr.
Fabaceae

Identification

- Vine to 100 feet in length
- Red-purple pealike flowers in spikes from the leaf axils; August to early September
- Compound leaves have 3 large oval leaflets
- Fruit is in a flat, brown dehiscent pod containing many seeds

Habitat

- Prefers mild winters and hot, humid summers
- Forests, grasslands, abandoned fields and homesteads

Background, Uses, and Method of Spread

- Introduced from China for erosion control and shade
- Spreads by stolons and seed production

Impacts

- Called “the vine that ate the south” because of its rampant growth over buildings, trees and objects
- Has a deep root system that is hard to destroy
- Can cause fires when it covers power transformers
- Competes with native vegetation

Management in Nebraska

- Root destruction and monthly, low mowing
- Grazing by goats and pigs
- Herbicides can be used if necessary

Biological Control

- Currently, no biological controls are host specific for use in the United States, more research is being done

- | | |
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| <input checked="" type="checkbox"/> | Federal Noxious Weed |
| <input type="checkbox"/> | State Noxious Weed |
| <input type="checkbox"/> | Watchlist Weed |

Asian Longhorned Beetle

Anoplophora glabripennis

Order: Coleoptera, Family: Cerambycidae

Insect

Dean Morewood, Health Canada, Bugwood.org



Michael Bohne, Bugwood.org

UGA126



Kenneth R. Law, USDA APHIS PPQ, Bugwood.org



Asian Longhorned Beetle

Anoplophora glabripennis

Order: Coleoptera, Family: Cerambycidae

Identification

- Also referred to as ALB; longhorned beetle, roundheaded borer
- One year lifecycle (in most places)
- Large beetle is black with white spots and has blue legs; about 33 mm long
- Color pattern is opposite cottonwood borer
- Antennae are black with white bands
- Larvae are white and may grow to 1.5-2 inches long

Host Plants

- Prefers maples (*Acer* spp.)
- Also found on horsechestnut, elm, birch, willow, and poplar

Background, Uses, and Method of Spread

- First found in New York in 1996; introduced from Asia
- Spreads through the movement of wood products and on vehicles

Symptoms

- Larval galleries under the bark
- Top dieback and yellowing of leaves in the spring and summer
- Deep, round holes about the size of a pencil
- Frass and sap may be found at exit holes

Management in Nebraska

- Currently ALB is NOT found in Nebraska
- Adults can be sprayed, removal of infected trees

Biological Control

- A few nematodes are being studied further, with no releases

Emerald Ash Borer

Agrilus planipennis Ledeb.

Order: Coleoptera, Family: Buprestidae

Insect

David Cappaert, Michigan State University, Bugwood.org



David Cappaert, Michigan State University, Bugwood.org



James W. Smith, USDA APHIS PPQ,
Bugwood.org

Emerald Ash Borer

Agrilus planipennis Ledeb.

Order: Coleoptera, Family: Buprestidae

Identification

- Also referred to as EAB
- Wood boring insect with a one year lifecycle
- Metallic green with bronze on the head and under the elytra
- About 13 mm long, indented along the elytra
- Larvae are milky white with triangular segments

Host Plants

- Ash species (*Fraxinus* spp.)

Background, Uses, and Method of Spread

- Originally introduced from Asia
- First found in Michigan in 2002
- Spreads through the movement of ash wood products and on vehicles from infested areas

Symptoms

- Top dieback and increased woodpecker damage
- 1/8 inch D-shaped borer holes along the trunk
- Suckering occurring at the base of the tree
- Larval galleries under the bark

Management in Nebraska

- Currently EAB is NOT found in Nebraska
- If found, tree injections can be used; remove infested trees

Biological Control

- Biological controls have been released only in Michigan
- *Spathius agrili* larvae parasitoid
- *Tetrastichus planipennis* larvae parasitoid
- *Oobius agrili* egg parasitoid

Gypsy Moth

Lymantria dispar
Order: Lepidoptera, Family: Lymantriidae

Insect

John H. Ghent, USDA Forest Service, Bugwood.org



Landesforstpräsidium Sachsen Archive, Bugwood.org



Connecticut Agricultural Experiment Station Archive,
Connecticut Agricultural Experiment Station, Bug-
wood.org



Gypsy Moth

Lymantria dispar

Order: Lepidoptera, Family: Lymantriidae

Identification

- One year lifecycle
- Males are dark brown with black “chevron” markings
- Females are white with black “chevron” markings
- European females do not fly, Asian gypsy moth females do fly
- Males have large feathery antennae
- Male wingspan is 1 3/8 inches, females wingspan is 2 4/8 inches
- Larvae are dark colored and hairy with 5 pairs of blue spots

Host Plants

- Prefer oaks but are found on over 300 species of trees

Background, Uses, and Method of Spread

- First introduced from Europe for silk production
- **First found in Massachusetts in the late 1800's**
- Spreads through the movement of nursery stock and on vehicles from infested areas

Symptoms

- Shot holes in leaves and foliage stripped from trees
- Declining trees from many years of damage

Management in Nebraska

- Currently gypsy moth is NOT an overwintering insect in NE; it is sporadically found here as a hitchhiker
- Chemical pesticides can be used

Biological Control

- *Bacillus thuringiensis* (Bt) var. *kurstaki*, natural insecticide, is non-toxic to mammals and other insects
- *Nucleopolyhedrosis* virus, only effective on gypsy moth

Japanese Beetle

Popillia japonica

Order: Coleoptera, Family: Scarabaeidae

Insect

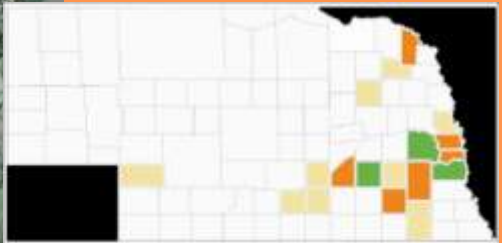
Clemson University - USDA Cooperative Extension
Slide Series, Bugwood.org



Mike Reding and Betsy Anderson, USDA
Agricultural Research Service, Bugwood.org



Jerry A. Payne, USDA Agricultural
Research Service, Bugwood.org



Japanese Beetle

Popillia japonica

Order: Coleoptera, Family: Scarabaeidae

Identification

- Scarab beetle, similar to a June beetle/June bug
- One year lifecycle
- Metallic green head and abdomen with brown elytra
- 5 white tufts similar to hair along the edges of elytra
- About 12 mm long
- White grub larvae have gray abdomens and brown heads

Host Plants

- Larvae are found feeding on turf roots
- Adults prefer the rose family, will feed on over 300 plant species

Background, Uses, and Method of Spread

- First found in New Jersey in 1916; originally from Japan
- Spreads through the movement of nursery stock

Symptoms

- Skeletonized leaves and defoliation of host plants
- Root damage to lawns caused by the larvae

Management in Nebraska

- Manual removal and elimination of the beetles using soapy water
- Chemical sprays can be used if necessary

Biological Control

- Control the larvae using milky spore bacteria or Bt
- *Heterorhabditis bacteriophora*; a nematode is commercially available for control
- *Tiphia vernalis*, a wasp; parasitizes the larvae
- *Istocheta aldrichi*, a fly; parasitizes the adults

Light Brown Apple Moth

Epiphyas postvittana

Order: Lepidoptera, Family: Tortricidae

Insect



Department of Primary Industries and Water, Tasmania Archive, , Bugwood.org



Department of Primary Industries and Water, Tasmania Archive, , Bugwood.org



Department of Primary Industries and Water, Tasmania Archive, ,



Light Brown Apple Moth

Epiphyas postvittana

Order: Lepidoptera, Family: Tortricidae

Identification

- Also referred to as LBAM
- Multiple generations per year are possible
- Light brown moths 8-10 mm long with darker brown forewings
- Larvae are green

Host Plants

- Roses, magnolias, grapes, peaches, pines, and oaks
- Can attack more than 1000 plant species including 250 fruit and vegetable plants

Background, Uses, and Method of Spread

- Originally introduced from Australia
- First found in Hawaii in 1800s, in California in 2007
- Spreads through the movement of agricultural products

Symptoms

- Leaf rolling on host plants
- Fruit feeding by the adult moth
- Larvae burrowing into the fruit

Management in Nebraska

- Currently LBAM is NOT found in Nebraska
- Surveillance

Biological Control

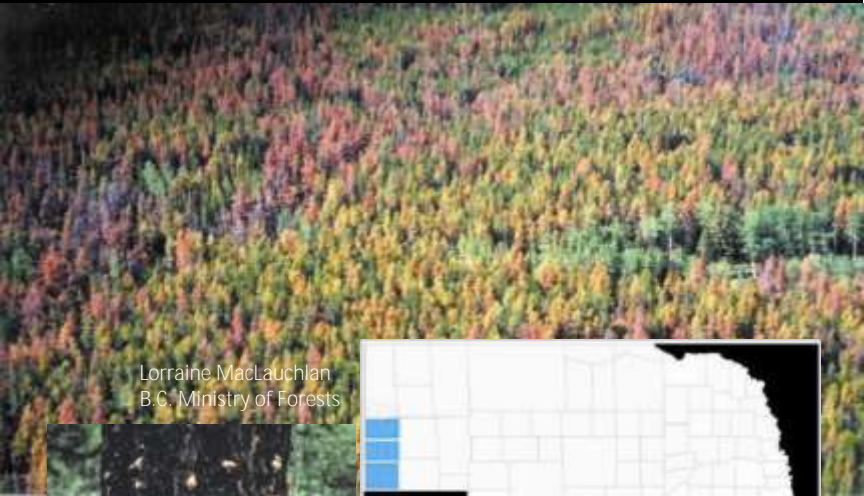
- *Trichogramma pretiosum*, parasitic wasp of larvae
- 3 Brachonidae wasps from Australia are being tested
- Sterile male releases

Mountain Pine Beetle

Dendroctonus ponderosae

Order: Coleoptera, Family: Scolytidae

Insect



Lorraine MacLauchlan
B.C. Ministry of Forests



Leo Rankin, B.C. Ministry of
Forests and Range



Dion Manastyrski, B.C. Ministry of
Forests and Range

Mountain Pine Beetle

Dendroctonus ponderosae

Order: Coleoptera, Family: Scolytidae

Identification

- Originally called Black Hills or Rocky Mountain Pine beetle
- Beetle that feeds on bark; one generation per year
- Cylindrical, black adults; the head is obvious from above
- About 4-7.5 mm long, indented along the elytra
- Larvae are white with a sclerotized head

Host Plants

- Mainly lodgepole and ponderosa pine, but attacks many other pine species

Background, Uses, and Method of Spread

- Native to the forests of North America
- Spreads through the movement of firewood or other wood products with bark still on the wood

Symptoms

- Foliage turns yellow to red through the crown
- Sawdust on and around trees at sites of bored holes
- **Resin, “pitch tubes”, on the trunk from tunneling**
- Blue stained wood due to the fungus vectored by the beetle

Management in Nebraska

- Maintain healthy tree populations
- If found, remove tree, burn the wood
- Remove the bark to expose the larvae to inhospitable conditions
- Insecticide treatments can be used if necessary

Biological Control

- Encourage woodpeckers and predatory insects such as clerid beetles to feed on the adults and larvae under the bark

Pine Shoot Beetle

Tomiscus piniperda

Order: Coleoptera, Family: Scolytidae

Insect



Beat Forster, Swiss Federal Institute for Forest, Snow and Landscape Research, Bugwood.org



Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org



Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Pine Shoot Beetle

Tomicus piniperda

Order: Coleoptera, Family: Scolytidae

Identification

- Also referred to as PSB, bark or engraver beetle
- One year lifecycle
- Adults vary in color between reddish brown and black
- About 3-5mm long, cylindrical bodies
- Larvae are white with brown heads, up to 5 mm long

Host Plants

- Pines (*Pinus* spp.)

Background, Uses, and Method of Spread

- First found in Ohio in 1992; originally from Europe
- Spreads through the movement of nursery stock and pine wood products

Symptoms

- Wilting on new branch shoots from burrowing adults
- Stunted tree growth
- Larval feeding galleries throughout the trees

Management in Nebraska

- Currently PSB is NOT found in Nebraska
- Destroy fresh wood in May to eliminate larvae that developed over the winter
- Summer and late winter foliar sprays can be used if necessary

Biological Control

- Biological control using a clerid beetle, *Thansimus formicarius*, is being studied for release

Red Lily Leaf Beetle

Lilioceris lili Ledeb.

Order: Coleoptera, Family: Chrysomelidae

Insect

Richard A. Casagrande, University of Rhode Island, Bugwood.org



Richard A. Casagrande, University of Rhode Island, Bugwood.org



Larvae



Richard A. Casagrande, University of Rhode Island, Bugwood.org



Red Lily Leaf Beetle

Lilioceris lili Ledeb.

Order: Coleoptera, Family: Chrysomelidae

Identification

- One year lifecycle
- Bright red elytra and pronotum with black ventral color
- Black legs and antennae, 1/4 inch-3/8 inch long
- Adults will squeak if squeezed
- Larvae are orange, yellow, or green with a black head

Host Plants

- All lilies are preferred but will feed on other plants
- Does not feed on daylilies

Background, Uses, and Method of Spread

- Originally from Europe
- First found in Massachusetts in 1992
- Spreads by its strong flying ability and through bulb shipments

Symptoms

- Sightings of the beetles, larvae, or eggs on the hosts
- Feeding damage on the flowers and leaves
- Complete defoliation of the host plants

Management in Nebraska

- Manual removal from the plant
- Remove the top 1/2 inch of soil where these insects hide
- Chemical controls can be used if necessary

Biological Control

- Biological control methods are still being studied
- *Tetrastichus setifer*, a parasitic wasp is the best candidate for larvae parasitism

Sirex Woodwasp

Sirex noctilio F.

Order: Hymenoptera, Family: Siricidae

Insect

Female



David R. Lance, USDA APHIS PPQ, Bugwood.org



Paula Klasmer, Instituto Nacional de
Tecnología Agropecuaria, Bugwood.org

Male



Pest and Diseases Image Library, Bugwood.org

Sirex Woodwasp

Sirex noctilio F.

Order: Hymenoptera, Family: Siricidae

Identification

- Wood boring wasp with a one year lifecycle
- Dark blue or black abdomen, yellow legs
- Males middle segments are orange
- About 1-1.5 inches long, large ovipositor on females
- Larvae are white and have a spine at the end of their abdomen

Host Plants

- Prefers Scotch, Austrian, maritime pines, and many more

Background, Uses, and Method of Spread

- Originally introduced from Europe, Asia, and N. Africa
- First found in Indiana in 2002, established in New York in 2005
- Spreads through movement of solid wood packing material

Symptoms

- Foliage wilts and changes color to eventually red
- Resin beads from egg laying sites
- Exit holes that are 1/8-3/8 inch diameter
- Females inject a fungus, a toxic mucous, and eggs into trees to provide a good environment for the larvae

Management in Nebraska

- Currently sirex woodwasp is NOT found in Nebraska
- Surveillance using Lindgren funnel traps

Biological Control

- Biological control using a parasitic nematode, *Deladenus siricidicola*, on the larvae to produce infertile female wasps

Water Flea

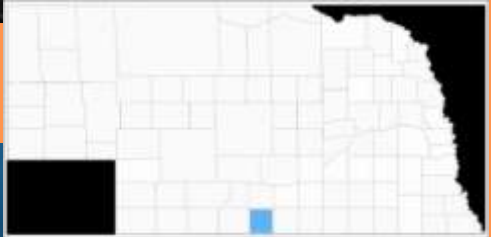
Daphnia lumholztzi

Order: Diplostraca, Family: Daphniidae



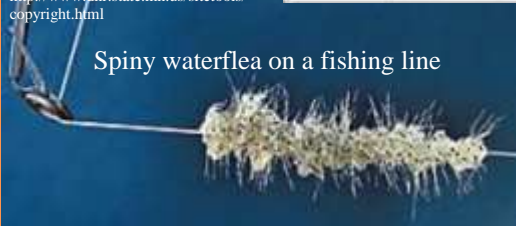
Minnesota Department of Natural Resources, 2010. The Minnesota Department of Natural Resources Web Site (online). Accessed 2010-4-11 at <http://www.dnr.state.mn.us/sitetools/copyright.html>

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Spiny waterflea on a fishing line



Water Flea

Daphnia lumholzi

Order: Diplostraca, Family: Daphniidae

Identification

- Is not an insect, but is an arthropod
- One year lifecycle
- Microscopic, helmet that is longer than native species
- About 3.5 mm long, tailspine about the same length

Host Plants

- Lakes, rivers, streams, and along the Republican River
- Found in Arkansas, Missouri, Mississippi, and Illinois rivers

Background, Uses, and Method of Spread

- Originally from Africa in Nile perch shipments
- First found in Texas in 1990
- Spreads through the movement of boats and through water

Symptoms

- Competition with native zooplankton, reducing food for zooplankton feeding fish
- Competition with native water fleas
- Rise in population when hottest; natives reduce population size at this time

Management in Nebraska

- Sanitation and removal of all water on boats before entering a new body of water
- **Don't discard aquarium water into local water**
- Chemical controls can be used if necessary

Biological Control

- Currently there are no biological controls

Glossary of Terms

Abdomen- the third section of an insect body

Achene- a one-seeded, indehiscent fruit with a relatively thin wall in which the seed coat is not fused to the ovary wall

Adventitious- refers to structures arising from an unusual place

Allelopathy- suppression of growth of a plant by a toxin released from a nearby plant of the same or different species

Axil- angle between an organ and its axis of attachment

Axis- the central or main longitudinal support upon which parts are attached

Ballast- any heavy material carried in a ship to provide desired draft or stability

Biennial- living for two years

Biological Control- controlling pests by interfering with their ecological status, such as introduction of a natural enemy into the environment

Bract- reduced leaves (frequently associated with the flowers)

Corolla- all of the petals considered collectively

Crown- persistent base of a herbaceous perennial; the upper portion of a shrub or tree; the tuft of hairs at the summit of the lemma in some grasses

Dentate- with pointed, coarse teeth spreading at right angles to the margin

Elytra- the forewings of coleopteran

Forb- herbaceous plants other than grasses and grass-like plants

Forage- the food for horses or cattle

Forewing- the anterior wing of an insect which is attached to the mesothorax

Frass- solid insect excrement

Gall fly- a type of fly that deposits its eggs into a plant, causing the formation of galls

Helmet- a hard protective covering of the head

Glossary of Terms

Integrated Weed Management (IWM)- using multiple methods such as cultural, biological, and chemical to control weeds in a crop

Invasive- a species that is not native to the ecosystem and one which the introduction of can cause economic or ecosystem harm as well as human health problems

Mesothorax- the second or middle thoracic segment which bears the middle legs and the anterior wings

Noxious- to be harmful or destructive

Ovipositor- an egg-laying tube of a female insect's abdomen

Palmate- with three or more lobes, nerves, or leaflets arising from a common point

Panicle- An indeterminate inflorescence whose primary axis bears branches of pedicelled flowers

Pinnatifid- deeply cut in a pinnate manner, but not cut entirely to the main axis

Pubescent- covered with short, soft hairs

Raceme- an inflorescence in which the spikelets or flowers are pedicelled on the rachis

Rachis-the axis of an inflorescence (spike, spicate raceme, or raceme) of a pinnately compound leaf

Rhizome- an underground horizontal stem with nodes, scale-like leaves, and internodes; usually involved in vegetative reproduction

Rosette- a basal, usually crowded, whorl of leaves

Sclerotized- when areas of an insect's body wall become hardened due to the consequences of the process of sclerotization

Skeletonized leaves- leaves that have been defoliated to the point at which there is only veins left

Stolon- a horizontal, above-ground, modified propagating stem producing new plants at its nodes

Sucker- to send out shoots

Glossary of Terms

Umbel- a simple flat-topped or rounded inflorescence with branches (pedicels or rays) radiating from a common point

Ventral- descriptive of the ventral (belly) surface of the abdomen

Viability- The measure of the number of individuals in a given phenotypic class that survive relative to another class.

Watchlist- a list determined by the Nebraska weed control association that serves as early detection, rapid response to potential invasive species that may impact Nebraska's ecosystems or economy

Weevil- a type of beetle with an elongated snout

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Useful Websites:

<http://www.aphis.usda.gov/>

<http://www.unl.edu/>

<http://www.agr.state.ne.us/>

<http://snr.unl.edu/invasives/>