Invasive Plant Species Pest Management

Agronomy Technical Note #16

Common buckthorn
Chris Evans, The University of Georgia, http://www.invasive.org

Garlic mustard
Chris Evans, The University of Georgia, http://www.invasive.org

Purpose

The purpose of this technical note is to identify invasive species and noxious weeds in Minnesota, provide general information for controlling or managing these harmful plants, and options to prevent new infestations from establishing.

Definitions

The majority of plant species brought to Minnesota (described as nonnative, nonindigenous, alien or exotic) do no harm and many are beneficial. Native plants may be noxious or nuisance to humans or livestock, such as jimsonweed or poison ivy. Invasive plants, native or exotic, spread beyond acceptable limits and can literally take over a site to form pure colonies. Lack of natural controls such as insects, diseases, predators and/or competition enable these species to thrive at the expense of valuable crops and natural communities. Ecologically and economically it is important to control invasive species before they impact an area beyond reasonable control and restoration efforts.

Invasive species and noxious weeds are separate categories of harmful plants. While both can adversely impact native ecosystems and farmland, invasive species tend to spread aggressively resulting in reduced diversity while noxious weeds do their harm not only by population density but also cause harm through poisons, allelopathy, thorns, alternative hosts to insects or diseases and unpalatability to livestock.

Invasive Species

USDA defines invasive species as those (plant) species whose introduction does, or is likely to cause significant negative impacts either economic or environmental and that do not provide an equivalent benefit to society. In the National PLANTS Database there are about 330 Genera of federally listed invasive species nationwide. In Minnesota invasive (plant) species dominate natural communities causing ecological or economic problems.

Noxious Weeds

Noxious weeds are plant species designated as such by the Secretary of Agriculture, Secretary of the Interior, or by State or county law. Noxious weeds, by law or regulation, must be controlled or eradicated. Minnesota designates plants as noxious weeds because they are found to be injurious to public health, the environment, public roads, crops, livestock and other property. Noxious weeds may be native or exotic.

Policy

National NRCS policy defines invasive species as those listed on an official county, state, or Federal noxious and/or invasive species lists. Species appearing on these lists will not be recommended in any NRCS developed conservation plan. The following is the official Minnesota Department of Agriculture (MDA) state listing of invasive and noxious plants. By policy this is also the official Minnesota NRCS list of invasive plant species.

MDA Invasive Species

Black Swallow-wort
Cut-leaved teasel
Grecian foxglove
Japanese knotweed

MDA Prohibited Noxious Weed List

(Must be controlled as per MN statutes)

Field bindweed
Hemp
Purple loosestrife
Garlic mustard
*MN native species
*Poison ivy
Leafy spurge
Perennial sowthistle
Bull, Canada, musk, plumeless thistles

Restricted Noxious Weeds:

(Minnesota statute prohibits the importation, sale and transportation of these plants or their propagating parts in the state.)

Common (European) and Glossy Buckthorn and all cultivars

Glossy buckthorn
Gil Wojciech,
Polish Forest Research Institute
http://www.invasive.org

MDA Secondary Noxious Weeds

(Found on county noxious weed lists – Where these species appear on a county noxious weed list they are also to be included on the local Minnesota NRCS invasive species list.)

Black nightshade
*Bracken
*Buffalobur
Burdock
*Common and *giant ragweed
*Common cocklebur
Common lambsquarters
*Common milkweed
*Common sunflower (except cultivars)
Curly dock
Fall panicum
Flixweed
Giant foxtail
Grecian foxglove
*Gumweed, curlycup
Hoary alyssum
*Jerusalem artichoke
Jimsonweed
Kochia
*Long sandbur
*Marshelder
Narrowleaf and smooth hawksbeard
Nightflowering catchfly
Orange hawkweed
Oxeye daisy
*Pennsylvania and ladysthumb smartweed
Prostrate and redroot pigweed
Quackgrass
Russian and spotted knapweed
Russian thistle
Sorghum
Tall buttercup
Tansy
Velvetleaf
Venice mallow
Wild buckwheat
White cockle
Wild carrot
Wild mustard
Wild oat
Wild proso millet
Wild radish
*Wirestem muhly
Wormwood
Woolly cupgrass
Yellow nutsedge (nutgrass)
*Yellow rocket
*MN native species

Additional species of concern in MN

Amur maple
Paul Wray,
Iowa State University
http://www.invasive.org

Listed below are additional plant species of concern as collected by the Minnesota Department of Natural Resources (DNR). Although these species are not considered invasive by NRCS care should be taken when considering the use of these plants. Some plants in the table are valuable for effective agricultural and pasture or forage management. When these plants are not part of a valuable agricultural use of the operation being planned, or in the immediate vicinity, landowners should be strongly encouraged to use other alternative vegetative options.

MnDNR's "Invasive terrestrial plants"
(Fact sheets about these species can be found on the MnDNR webpage:
http://www.dnr.state.mn.us/invasives/index.html)

Amur maple
Amur silver grass
Birdsfoot trefoil
*Black locust
Butter and Eggs (Toadflax)
Common tansy
Cow, Crown and hairy vetch (axseed)
Creeping Charlie
Exotic honeysuckles
Flowering rush
Garlic mustard
Grecian foxglove
Hoary alyssum
Japanese barberry
Japanese and spotted knapweed
Leafy spurge
Norway maple
Orange hawkweed
Oxeye daisy
Purple loosestrife
Queen Ann's lace
Reed canary grass
Russian olive
Siberian elm
Siberian peashrub
Smooth brome grass
White and yellow sweet clover
Wild parsnip
Yellow iris
* MN native species

Control Management Options

Eradicating an established community of invasive plants is extremely difficult, very expensive and may be impossible. Controlling infestations to a moderate level is more reasonable yet still can prove to be difficult and costly. The most successful programs involve intimate knowledge of the species' life cycle and striking it at the most vulnerable point. For example, to control common buckthorn (*Rhamnus cathartica*) removal of stumps or stems and application of herbicides to the exposed cuts is most effective during mid- to late fall when buckthorn is still active and its leaves are green. At this time most native plants are either dormant, in fall colors or leafless.

Common Tansy
Michael Shephard, USDA Forest Service,
http://www.invasive.org

In general there are four control methods: mechanical (including manual), prescribed burn, chemical and biological. Effective management programs use one or more methods as

appropriate. No matter what method is used, care must be taken to avoid or limit harm to the native species and plant communities that are present and can provide a ready source of revegetation. Applying a broad spectrum herbicide on an infested area may eradicate the invasives, but it may also cause great harm to native plants and the environment at large.

NRCS Conservation Practice Standard Pest Management, Code 595, covers most of the treatments mentioned below along with Prescribed Burning, Code 338. Other conservation practices may be used as appropriate to help recover damaged areas such as Upland Wildlife Habitat Management, Code 645; Wetland Wildlife Habitat Management, Code 644; Restoration and Management of Declining Habitats, Code 643, Forest Stand Improvement, Code 666; Conservation Cover, Code 327 and Critical Area Planting, Code 342; other practices may be used as appropriate.

Mechanical Treatment

Mechanical treatment physically removes small stems and roots manually or with a tool. Pulling, grubbing, wrenching, girdling and grinding (if not a suckering species) are mechanical techniques for removing woody plants. Repeated mowing before seed set is an effective treatment with herbaceous species.

Considerations:

As with most of these treatments, mechanical methods take lots of time, human resources, tools, transportation and a means to remove or destroy the waste materials. Mechanical treatments leave no chemical residues and with careful application do not damage existing plants. Pulling and grubbing works best on herbaceous species while weed wrenches are suited for plants with woody stems no more than 1-2 inches in diameter. Girdling the trunk of larger woody plants produces little waste, does not disturb nearby plants and may enhance wildlife by providing snags and nesting habitats. Mowing is most effective on annuals that will not resprout or on herbaceous species that do not sprout from cut pieces. Disadvantages of these treatments include leaving pieces or roots enabling sprouts, creating openings for other plants to invade and accidental spreading of seeds. These methods are most effective in small newly infested areas and in areas isolated from repeat infestations.

Weed wrench
Craig Stange, NRCS forester, using a weed wrench on Siberian elm.
FEP, Becker, MN.

Prescribed Burn

Burning prairies and savannahs on a regular basis, about every 3 years, will control woody invasive plants and some herbaceous invasives. In some cases burning may favor herbaceous invasives. It is important to be familiar with the ecosystem types and species and to control the burn intensity for maximum effect.

Considerations:

Prescribed burns are quick and effective in eradicating invasive woody plants usually without harming prairie or savannah ecotypes. However, some invasive species benefit from prescribed

burns while this method can harm some native plants. Neighbors may object to the smoke of a prescribed burn. This method is best used in remote and large open areas that have a severe infestation of invasive species and other methods are not practical.

Chemical Treatment

Chemical treatments include herbicides or other poisons applied to unwanted plants or infested areas. Treatments include wicking or painting whole plants, leaves or the cambium layer on a cut stump, spraying an herbicide on a wounded trunk or stem, spraying the entire perimeter of a trunk from the ground to 18" high, using foliar sprays or a broadcast spray. For further information about pesticide use follow the guidelines in the NRCS Conservation Practice Standard Pest Management, Code 595.

Considerations:

Using the right chemical at the right time in the right place will cause little harm to the environment. Wicking or painting an approved chemical is economical and it effectively kills the plant or keeps it from sprouting. Disadvantages of this treatment include cost of chemicals and application, persistent residues from chemical use or spills and the chemicals used can harm non-target species, humans, livestock or wildlife. Repeat treatments may be necessary to provide effective control or eradication. Since this treatment is expensive and highly regulated, use it on small areas with a light infestation or on concentrated areas with a severe infestation.

Biological Treatment

Biological Control
Beetles imported to control purple loosestrife

Releasing insects, fungi or bacteria onto the invasive plant or in an infested area is a long term solution that attempts to control the spread of the invasive plant without chemical residues, burning or waste materials. Biological controls are very complex, heavily regulated and monitored. Check the MnDNR web site to find out more about this treatment.

Considerations:

Natural predators that have been tested and brought over from the native source of the invasive plant are effective controls. It takes many years of tedious studies to locate and isolate native predators and to check that they do not attack native plants, which always remains a possibility. Effective population numbers take many years to build up to see any measurable decline in the invasive species population, however once established the predator-prey balance would keep the invasive plants in control.

Post Control Management/Restoration

Areas newly freed from invasive species may need to be restored to desirable species. Additional treatments of any of the above methods may also be necessary to keep cleaned areas free of new infestations. Scouting treated areas on an annual basis will catch new infestations and treatment can be immediately applied before the environment is harmed.

Protection

Most invasive species colonize areas that lack a healthy, stable ground cover such as eroding ditches or road-sides and in poorly managed areas such as old fields and degraded pastures. Fence rows and edges between open areas and woodlands are also notorious sites for new infestations. Maintaining good plant cover on all the areas in the landscape will retard invasive species colonization. Taking immediate action to eradicate invasive plants when they are small and before they set seed is very effective and inexpensive.

Preventing the establishment of invasive and noxious plants is much cheaper than trying to eradicate an invasion. If a new invasive species is suspected contact the MDA's Arrest the Pest Hotline at 1-651-201-6684 (metro) or 1-888-545-6684 (out-state).

Resources

NRCS Policy regarding invasive species
GM Title 190, Part 414 – Invasive Species, Subparts A-D
http://policy.nrcs.usda.gov/scripts/lpsiis.dll/GM/GM_190_414.htm

National Invasive Species Council
http://www.invasivespeciesinfo.gov/council/main.shtml

National Invasive Species Management Plan
http://www.invasivespeciesinfo.gov/council/nmp.shtml

MN Department of Natural Resources
State invasive species fact sheets
http://www.dnr.state.mn.us/invasives/index.html

Minnesota Department of Agriculture
Invasive Species Unit
http://www.mda.state.mn.us/invasives/default.htm

Interagency U.S. invasive species information system
Species profiles, geographic information, vectors and pathways, laws and regulations, and more.
http://www.invasivespeciesinfo.gov/

USDA Plants Database, Plant Topics, Invasive and Noxious
Search for federal and state lists of invasive plants
http://plants.usda.gov/cgi_bin/topics.cgi?earl=noxious.cgi

Invasive and Exotic Plant Species Image Collection
Images of invasive and exotic weeds, insects and diseases world-wide
http://www.invasive.org

Weeds Gone Wild (Alien plant invaders of natural areas)
Fact sheets, lists, publications, articles
http://www.nps.gov/plants/alien/

Bull thistle
Britt Slattery, U.S. Fish and Wildlife Service, http://www.invasive.org

Creeping Charlie, Ground ivy or Gill-over-the-ground
Jil M. Swearingen, USDI National Park Service, http://www.invasive.org