ROADSIDE VEGETATION MANAGEMENT

In most jurisdictions roadside (within roadway right-of-way) vegetation management is completed by public works agencies, departments of transportation, or the contractors of these entities. One of the primary objectives of these planting and mowing activities is roadway safety. Roadside vegetation management policies and practice are often designed to provide a clear line of sight along the roadside and to minimize woody vegetation that may grow into a hazardous object to vehicles that leave the road. The suggested distance from a roadway lane that should be free of hazardous objects (e.g., individual trees greater than 4 inches in diameter, or groups of trees with an effective diameter of 4 inches) is called the clear zone and varies with traffic volume, vehicle speed, and roadside sideslope (*1*).

Other objectives of roadside vegetation management policies and practices include the encouragement of quick plant growth after construction (to avoid soil erosion), the control of invasive species, and roadway aesthetics. Plantings that are easily managed and appropriate to the locality are also important because the cost to the public of roadside vegetation management activities needs to be minimized. Mowing timing (i.e., when it occurs during the year), frequency (i.e., how often the mowing occurs), and intensity (a measure related to vegetation height) have both ecological and cost impacts (*2*).

It has been generally suggested that the results of some typical roadside vegetation management activities may attract white-tailed deer and increase the number of deer-vehicle crashes (DVCs). The type of vegetation planted along roadsides and roadside mowing practices (i.e., when and how often) of transportation agencies are typically the focus of these discussions. The suggestions that there is a potential connection between roadside vegetation management and DVCs appear to be primarily based on opinions about the type and growth level (e.g., freshly cut) of vegetation that appeals to white-tailed deer.

No studies were found that quantitatively related specific roadside vegetation management policies or practices to the number of DVCs occurring along a roadway segment. However, a few studies are described in this summary that specifically considered the relationship between white-tailed deer activities (e.g., apparent feeding or browsing) and certain types of vegetation (*3*, *4*, *5*). In addition, two European studies are summarized that considered the impacts of vegetation clearing on vehicle-moose and train-moose collisions (*6*, *7*). Related studies that examined white-tailed deer repellents or attempted to model or investigate the relationship between land cover (e.g., woodland or crops) adjacent to the roadway right-of-way and the number or probability of DVCs are described in the repellent, hunting or herd size reduction, and speed limit reduction summaries within this toolbox.

Most of the documents or webpages that discuss vegetation and white-tailed deer focus on residential planting choices rather than roadside management (*8*, *9*, *10*, *11*, *12*, *13*, *14*, *15*, *16*, *17*, *18*). The information contained in these information sources is typically based on expert opinion. An example of a "deer resistant" plant list based on expert opinion (from New Jersey) is included at the end of this summary (*5*). The applicability of these expert opinions to roadside vegetation management decisions was not addressed in any of the documents reviewed. In October 2003, however, the Minnesota Department of Transportation released a "Plant Selector" program to the public (*17*). The program is designed to help decision-makers make better roadside plant choices, and it includes a wildlife rating and animal damage choice as inputs to be considered in the roadside plants it suggests. This program is described briefly at the end of this summary.

Deer Activity and Vegetation Studies

A few studies were found that summarized the activities of white-tailed deer and other animals with respect to certain types of vegetation (*3*, *4*, *5*). More specifically, these studies were typically designed to investigate the vegetation impacts and/or preferences of different animals species. Two of the studies focused on right-of-way plantings, and another included a garden estate evaluation of plantings that might also be applicable to the roadside vegetation decisions (*3*, *4*, *5*).

In 1980 a study commissioned by the West Virginia Department of Highways investigated animal activity near three types of highway right-of-way plots (*3*). The plantings in each plot were Crownvetch, Sericea Lespedeza, and Fescue (*3*). Animal signs (e.g., tracks and fecal droppings) near these plantings were recorded from October 1977 to July 1979 along one segment of interstate highway. It was concluded by the researchers that white-tailed deer appeared to prefer the Crownvetch while smaller mammals preferred the Fescue (*3*). A statistical analysis of the animal signs indicated that the plant preference by white-tailed deer was significant (*3*).

Researchers at Ball State University also attempted to evaluate wildlife use and the potential animal-vehicle collision impacts of shrubs (i.e., woody plantings) placed by the Indiana Department of Natural Resources along four segments of four-lane highway (*4*). Fourteen species of shrubs and trees were planted (e.g., Flowering Dogwood, American Hazelnut, Redbud, etc.) and a total of 156 plots (79 roadside shrub sites and 77 roadside control grass sites) studied. These plots were 328 feet long.

The Ball State University researchers recorded animal activity (i.e., bird and mammal sightings, bird nests, tracks, feces, and gnawings) and wildlife carcasses within all of the plots during four study periods (i.e., June, July, and September of 1983, and mid-December 1983 to mid-January 1984) (*4*). No live white-tailed deer or white-tailed deer carcasses were observed during the data collection activities, but signs of deer activity and plant usage were noted. However, the researchers did conclude that there was no statistically significant difference between the numbers of other animal carcasses they did observe in the control (i.e., grassy roadside) and test (i.e., woody plantings) plots (*4*). In addition, the number of live rabbits and birds in the shrub test plots was greater than those observed in the grassy control plots (*4*). Based on these findings, the researchers concluded that right-of-way plantings could be managed to encourage wildlife use without increasing the number of animal-vehicle collisions. They recommended that a similar study be completed to evaluate roadway segments that have had natural vegetative growth (*4*). They felt that similar results, without the cost of planting,

spraying, or mowing may indicate an even more efficient method of enhancing wildlife activity without increasing animal-vehicle collisions (*4*).

Finally, the plant species preferences of white-tailed deer were studied at the Tracy Estate Research Garden in Morris County, New Jersey (*5*). In March 1991 six test plots within the garden were created. Initially, the plants were in containers, and these containers were then surrounded by wood mulch in May 1991. In December 1991 the plants were set in the ground and again surrounded by wood mulch. A number of the different "deer resistant" plants in the list at the end of this summary were evaluated (*5*). The plants introduced in March 1991 were generally trees species (e.g., Common Boxwood, Colorado Spruce, Inkberry Holly, etc.). Several grasses were also planted in July 1991 (e.g., Plume Grass, Silver Grass, Maiden Grass, etc.), and in January 1992 a series of grass types were also planted. These grasses included Sweet Flag, Bulbous Oat, Feather Stricta Reed, Northern Sea, Wood Rush, and Pigmy Bamboo (*5*). Some of these plant types may be relevant to right-of-way vegetation decision-making.

The browsing of each plant species within each plot was ranked every few days after the planting was first installed and then once a week during the summers from March 1991 and December 1992 (*5*). A ranking of zero indicated no browsing, and a ranking of three indicated that 76 to 100 percent of the leaves and twigs were browsed (*5*). The plants investigated that showed no sign of browsing (i.e., a ranking of zero) included the following:

- Catmint,
- Silver Grass,
- Plume Grass,
- Fountain Grass,
- Silver Mound Artemesia,
- Bulbous Oat Grass,
- Feather Reed Grass, and
- Epimedium.

Plants that were already on the Tracy Estate Research Garden site, but also did not exhibit any browsing included:

- Pachysandra,
- American Holly,
- Hay Scented Fern,
- Narcissus,
- Scilla (Not in Attached "Deer Resistant" Appendix),
- Foxglove,
- Siberian Iris,
- White Snakeroot (Not in Attached "Deer Resistant" Appendix),
- Japanese Barberry, and
- Fragrant Sumac.

The shrub species that were planted and received a browsing rank of one (i.e., a leaf and twig browsing level from 1 to 25 percent) included:

- Japanese Boxwood,
- Colorado Blue Spruce,
- Common Boxwood,
- Dwarf Alberta Spruce,
- Japanese Andromeda, and
- William Penn Barberry.

Ornamental grasses and perennial plant species that received a ranking of one included: Lamb's Ear, Weeping Love, and Maiden Grass (5).
The applicability of the Morris County, New Jersey results to roadside management decisions was not addressed, and needs to be considered on case-by-case and plant-by-plant basis. The researchers in New Jersey also suggested that certain plant species (e.g.,

the William Penn Barberry) could be used as a barrier to white-tailed deer browsing by using them to surround more sensitive or palatable plants (*5*). The type of plant species that white-tailed deer feed on also depends on the preferences of particular herds and the competition for alternative food (*5*).

Vegetation Clearing and Moose Mortality

Two studies from Europe were found that considered the impacts of clearing vegetation on collisions between moose and motor vehicles/trains (*6*, *7*). The first study was completed in Sweden, and Lavsund and Sandegren summarized its original documentation (which was in Swedish) as part of their discussion of moose-vehicle interactions within that country (*6*). They indicate that the study collected and compared three years of moose-vehicle collision data for roadway segments without and without roadside clearing (*6*). In this case, roadside clearing was defined as the removal of all vegetation below 9.8 feet (3 meters) within 65.6 feet (20 meters) of the roadway (*6*). A comparison of the crash data for the treatment and control segments indicated that roadside vegetation clearing resulted in almost a 20 percent reduction in moose-vehicle crashes (*6*). However, it was recognized that this reduction was very close to the natural variability of the moose-vehicle crash data, and that the roadway clearing was considered expensive to apply and maintain (*6*). The details and validity of this crash analysis could not be confirmed, but the results seem to indicate that roadside vegetative clearing may hold some promise as a focused DVC reduction measure.

In addition to the study in Sweden, the impact of vegetation clearing on moose-train collisions in Norway has also been studied (*7*). In this study "high" moose-train collision segments 13.7 miles (22 kilometers) long were identified and cleared, and 24.1 miles (38.8 kilometers) of adjacent roadway segments were used for comparison purposes (*7*). Railside clearing in this case was defined by the removal of all bushes and trees within 65.6 feet (20 meters) of the railroad and anything less than 9.8 to 13.1 feet (3 to 4 meters) was cleared between 65.6 to 98.4 feet (20 to 30 meters) from the railroad (*7*). In addition, vegetation was removed within 196.9 feet (60 meters) of the railroad at critical locations (e.g., curves).

Four years of crash data before and after the vegetation was removed were compared, and the differences in the data for the treatment and control sections were also evaluated (*7*). However, a large amount of variation in the total number of moose-train collisions was observed along all of the segments, and the number of collisions observed was relatively small (i.e., no more than 37 moose were killed along any segment within the four years considered) for evaluation purposes. It was concluded that the vegetation removal reduced moose deaths by about 56 percent, but that the uncertainty of this estimation was relatively high (*7*). It was also recognized that the crash results from the treatment and adjacent control sites were probably not independent (i.e., the removal of vegetation may have lead to more crashes in the segments that were not cleared), and that the choice of removing vegetation only from segments with a "high" number of moose-train collisions may have impacted the results (*7*). Both factors would result in overstating the crash reduction impacts of the vegetation clearing. Study site independence and location choices are a concern in most of the studies reviewed for this toolbox, but there few in which they are actually documented. Overall, these concerns and the moose-train focus of this study also limit the applicability of its positive results to the roadway environment. There is a need to properly investigate the potential reduction impacts and cost-effectiveness of the roadside vegetation removal.

"Deer Resistant" Plant Advice

A large number of documents and webpages focus on the relationship between vegetation and the eating habits of white-tailed deer (*8*, *9*, *10*, *11*, *12*, *13*, *14*, *15*, *16*, *17*, *18*). These information sources focus on residential plantings, and many include a list of plants and shrubs that experts believe white-tailed deer are less likely to eat. An example of a "deer-resistant" plant list, based on the list creator's opinion, is included at the end of this summary (*5*). Unlike the studies previously described, however, no data is typically provided in these documents to support the choice of the plant species in their lists (*8*, *9*, *10*, *11*, *12*, *13*, *14*, *15*, *16*, *17*, *18*). Most of the lists are based on expert judgment and experience.

The audience for these documents and webpages is typically gardeners and/or homeowners (*8*, *9*, *10*, *11*, *12*, *13*, *14*, *15*, *16*, *17*, *18*). The applicability and cost-effectiveness of "deer resistant" plant advice to vegetation choices along the roadside will need to be determined by staff in the agencies responsible for these decisions. All of these documents also warn that their lists should only be used as guidelines and that the "resistance" of these plants to white-tailed deer browsing depends on the availability of other more desirable food and the needs of the animal. Other factors that impact the desirability of plants to white-tailed deer include the type and maturity of plants, and the past experience of a white-tailed deer with a plant. Most of the documents also indicate that white-tailed deer will eat almost any plant if they are hungry enough. This type of behavior was also observed in the repellent studies summarized in another part of this toolbox.

Several of the documents and webpages reviewed for this summary that focus on gardening or residential vegetation choices are listed below.

- *Outwitting Deer*: A gardening guide in which the author identifies a series of vegetation species that are relatively deer resistant, and stresses using plants that have deterrent odors or thorns (*8*).

- *Deer Proofing Your Yard & Garden*: In this book there is a "deer-o-scaping" chapter that lists plants which appeal to and may be more relatively resistant to white-tailed deer (*9*).

- *Gardening in Deer Country*: This book contains a significant list of plants resistant to deer browsing. It includes more than 60 pages of trees, shrubs, groundcover, vines, perennials, annuals, bulbs, and herbs in its "deer resistant" plant list (*10*).

- *Solving Deer Problems – How to Keep them out of the Garden, Avoid them on the Road, and Deal with them Everywhere!*: Chapters in this book focus on fencing, repellents, and plants unpopular with deer. More than 80 pages of plants that are

typically avoided by white-tailed deer are listed. Suggestions are also often provided about the locations in which particular plants might thrive. Lists of "deer resistant" annuals and biennials, herbs, vegetables, fruits, perennials, bulbs, ferns, shrubs and trees are included (*11*).

- A few of the many internet webpages that may be of interest:
  - http://www1.uwex.edu/ces/pubs/ (The University of Wisconsin Extension service offers UW Extension Bulletin A372 – *Plants not Favored by Deer*. This type of document is also provided by a number of extension programs throughout the United States.) (*16*).

  - http://home.ptd.net/~jchorba/deerlist.htm (Private Landscaper Page) (*17*).

  - http://lonestar.texas.net/~jleblanc/deerplants.html (Native Plant Society of Texas) (*18*).

New Plant Selection Tool

In October 2003 the Minnesota Department of Transportation introduced a "Plant Selector" program (*17*). The objective of this program is to help decision-makers make better roadside plant selections. The program includes lists of plant species for trees and shrubs, grasses and sedges, flowering perennials and annuals, ferns, and for windbreak suitability (*17*). For each type of plant or the windbreak suitability objective the user of the program can also identify and select criteria or characteristics for the site and the plants wanted. There are more then 25 site characteristics to choose from and about 20 plant characteristics. Criteria and characteristics that may be relevant to this summary is the ability of the user to indicate a low, medium, or high wildlife ranking as a plant characteristic, and to characterize the site as experiencing animal damage from deer, mice/voles, rabbits/hares, and gophers (*17*). Signs of deer plant damage can be identified by the appearance of bark removal (from rubbing) and 90 degree browsing (*17*). The "Plant Selector" program is available for use at http://plantselector.dot.state.mn.us/. How a plant in the list of plants included in the program is determined to be more or less

susceptible to white-tailed deer browsing does not appear to be documented on the webpage.

Conclusions

No studies were found that specifically considered the impact of changes in roadside vegetation management policies and their subsequent impact on the number of DVCs. The three studies summarized here generally focused on the plant preferences of white-tailed deer and other animals. One study found that white-tailed preferred Crownvetch in comparison to Sericea Lespedeza and Fescue. Another concluded that the addition of woody shrubs in the right-of-way appeared to encourage wildlife usage, but did not increase the numbers of animals killed along the roadway. However, this study lasted only about six months and no white-tailed deer or deer carcasses were observed near the test or control plots. A third study considered the browsing preference of white-tailed deer on a series of plants within a garden estate in Morris County, New Jersey. Lists of the most "deer resistant" plants tested are included in this summary and the entire plant list from that study is in the attached appendix. The applicability of the results from this experiment will need to be determined on a case-by-case (i.e., location-by-location and plant-by-plant) basis.

Two studies were found, however, that may at least show the DVC reduction potential of vegetation clearing. These studies focused on collisions between moose and motor vehicles or trains. In the first study roadside vegetation less than 9.8 feet (3 meters) high was removed within 65.6 feet (20 meters) of the roadway, and a reduction in moose-vehicle crashes of almost 20 percent was observed. This reduction, however, was close to the natural variability of this data, and the approach was considered to be relatively expensive. The second study evaluated the removal vegetation along railroads in Norway, and in this case all vegetation was removed within 65.6 feet (20 meters) of the railroad and anything less than 9.8 to 13.1 feet (3 to 4 meters) was cleared out to 98.4 feet (30 meters). A crash comparison showed more than a 50 percent reduction in moose-train collisions due to the clearing, but the results were highly variable. In addition, the researchers did recognize that their experimental design could have resulted in an

overstatement of the crash reductions from vegetation clearing. Both studies show the DVC reductions that might result from a localized application of vegetation removal, but there is still a need to properly study and document the safety, ecological, and cost impacts of this approach along roadway segments.

The majority of the information sources available on this subject are documents that focus on helping the homeowner and/or gardener choose plants that are more "deer resistant". The "deer resistant" plant lists contained in these documents are typically based on expert opinion and experience. They also commonly include the warnings that the "deer resistance" of a particular plant depends on the location and the local white-tailed deer herd preferences/experiences, and that white-tailed deer will eat almost anything if necessary. The Minnesota Department of Transportation also recently introduced a new tool entitled the "Plant Selector". The objective of this program is to help decision-makers choose roadside plants. An animal damage and wildlife rating are two inputs to the program. The comprehensive list of plants included in the model does not include invasive varieties to Minnesota, and how an individual plants was determined to be more or less susceptible to white-tailed deer browsing does not appear to be documented.

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APPENDIX A
Table A.1. Example List of "Deer Resistant Plant Species (*5*).

Botanical name	Common Name
Abies spp.	Fir
Acanthopanax Siemboldianus	Five leaf aralia
Acer negundo	Boxelder
Achillea millefolium	Yarrow
Aconitum uncinatum	Monkshood
Acorus calamus	Sweet flag
Ageratum Houstonianum	Flossflower, ageratum
Ailanthus altissirna	Tree of heaven
Allium spp.	Garlic, chives, wild onion
Alnus serrulata	Smooth alder
Alnus glutinosa	Black alder
Althaea rosea	Hollyhock
Anaphallis margaritacea	Pearly everlasting
Anchusa azurea	Italian bugloss
Anemone japonica	Anemone
Anemone vitifolia robustissima	Anemone
Aquilegia spp.	Columbine
Aralia spinosa	Devils walkingstick
Aralia elata	Japanese angelica tree
Arctostaphylos uva-ursi	Bearberry
Arctotis stoechadifolia	African daisy
Arrhenatherum elatius bulbosom	Bulbous oat grass
Artemesia spp.	Artemesia
Asclepias tuberosa	Butterfly weed
Asimina triloba	Pawpaw
Astilbe spp.	Astilbe
Aruncus dioicus	Goatsbeard
Berberis spp.	Barberry

Table A.1. Continued.

Betula spp.	Birches
Buddleia alternifolia	Fountain butterfly-bush
Buddleia davidii	Orange-eye butterfly-bush
Buxus spp.	Boxwood
Cactaceae spp.	Cactus
Calamagrostis acutiflora stricta	Feather reed grass
Clendula officinalis	Pot marigold
Callicarpa dichotoma	Purple beautyberry
Callicarpa japonica	Japanese beautyberry
Calluna vulgaris	Heather
Calycanthus fertilis	Pale sweetshrub
Cassia spp.	Senna, cassia
Catalpa bignonioides	Common catalpa
Centaurea montana	Mountain bluet
Cephalotaxus harringtonia	Japanese plum-yew
Cercis occidentalis	Red bud
Chamaecyparis obtusa	Hinoki false cypress
Chamaedaphne calyculata	Leatherleaf
Chasmanthium latifolium	No. sea oats
Chelone spp.	Turtlehead
Chionanthus virginicus	American fringetree
Chrysanthemum maximum	Shasta daisy
Cimicifuga racemosa	Bugbane
Clematis spp.	Clematis
Clerodendron trichotomum	Harlequin glory-bower
Clethra alnifolia	Sweet clethra, summersweet
Colchicum spp.	Autumn crocus
Comptonia peregrina	Sweet-fern
Convallaria majalis	Lily of the Valley
Cotinus coggygria	Smoke tree

Table A.1. Continued.

Cornus spp.	Dogwood
Cotoneaster spp.	Cotoneaster
Crataegus laevigata	Hawthorne
Cryptomeria japonica	Cryptomeria
Cunninghamia lanceolata	China fir
Cytisus scoparius	Scotch Broom
Davidia involucrata	Davidia
Delphinium spp	Larkspur
Dicentra spectabilis	Bleeding heart
Digitalis spp.	Foxglove
Elaeagnus angustifolia	Russian-olive
Eleagnus commututa	Silverberry
Enkianthus campanulatus	Redvein enkianthus
Epimedium spp.	Epimedium
Erianthus ravennae	Plume grass
Erica camea	Winter heath
Erigeron philadelphicus	Fleabane
Euonymus alatus	Winged euonymus
Euonymus atropuroureus	Wahoo
Euphorbia cyparissias	Spurge
Festuca cinnerea	Blue fescue
Ficus spp.	Fig
Forsythia intermedia	Forsythia
Galanthus nivalis	Snowdrops
Gaultheria procumbens	Checkerberry
Gayllussacia baccata	Black buckleberry
Geranium spp.	Cranesbill
Gingko biloba	Gingko, maidenhair tree
Gleditsia triacanthos	Honey locust
Glmnocladus dioica	Kentucky coffee tree

Table A.1. Continued.

Gypsophila paniculata	Baby's breath
Hamamelis virginiana	Common witch hazel
Hedera helix	English ivy
Helianthus spp.	Sunflower
Helichrysum spp.	Strawflower
Helleborus spp.	Hellebore
Hydrangea paniculata	Hydrangea
Ilex aquifolium	English holly
Ilex cornuta	Chinese holly
Ilex crenata	Japanese holly
Ilex glabra	Inkberry
Ilex opaca	American holly
Ilex vertcillata	Black-alder
Iris spp.	Iris
Juglans regia	English walnut
Juglans nigra	Black walnut
Juglans cinerea	Butternut
Juniperus chinensis	Chinese juniper
Juniperus rigida	Needle juniper
Juniperus communis	Common juniper
Knophofia uvaria	Devlis or red hot poker
Kolkwitzia amabilis	Beautybush
Lantana montevidensis	Trailing lantana
Larix decidua	European larch
Lavandula officinalis	Lavender
Leucothoe fontanesiana	Drooping leucothoe
Leucothoe racemosa	Sweetbells
Ligustrum obtusifolium	Myama privet
Ligustrum ovalifolium	California privet
Lindera benzoin	Spicebush

Table A.1. Continued.

Liquidambar styraciflua	American sweetgum
Lonicera fragrantissima	Winter honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera tatarica	Tartarian honeysuckle
Lupinus spp.	Lupine
Lusimachia nummularia	Moneywort
Luzula nivea	Wood rush
Lychnis chalcedonica	Maltese cross
Lyonia ligustrina	Male-berry
Lyonia mariana	Staggerbush
Maclura domfera	Osage orange
Magnolia spp.	Magnolia
Mimulus spp.	Mimulus, Monkey flower
Miscanthus sinensis	Chlnese silver grass
Miscanthus sinensis 'gracillimus'	Maiden grass
Monarda didyma	Bee balm
Myosotis spp.	Forget-me-not
Myrica californica	Wax myrtle
Myrica pensylvanica	Northern bayberry
Myrtus communis	Myrtle
Narcissus spp.	Daffodil, Jonquil
Nepeta faassenii	Catmint
Nyssa sylvatica	Tupelo, pepperidge
Oxalis oregana	Oxalis, redwood sorrel
Oxydendrum arhoreum	Sorrel tree
Pachysandra terminalis	Japanese pachysandra
Paeonia spp.	Peony
Paulownia tomentosa	Empress-tree
Panayer orientale	Oriental poppy
Parkinsonia aculeata	Jerusalem thorn

Table A.1. Continued.

Pennisetum alopuroides	Fountain grass
Phaedranthus buccinatorius	Blood red trumpet vine
Philadelphus spp.	Mockorange
Phyllostachys aurea	Golden bamboo
Phyllostachys aureosulcata	Gold-furrowed bamboo
Physocarpus opulifolius	Common ninebark
Physosstegia virginiana	Obedience plant
Picea abies	Norway spruce
Picea glauca	White spruce
Picea glauca conica	Dwarf Alberta spruce
Picea pungens glauca	Colorado blue spruce
Picea pungens	Blue spruce
Picea rubens	Red spruce
Picea mariana	Black spruce
Pieris japonica	Japanese andromeda
Pinus spp.	Pine
Poncirus trifoliata	Hardy orange
Pseodosas japonica	Metake
Pulmonaria officinalis	Lungwort
Rhamnus catharticus	Common buckthorn
Rhamnus frangula	Glossy buckthorn
Rheum rhaponticum	Rhubarb, Pie plant
Rhododendron nudiflorum	Pinxter azalea
Rhododendron roseum	Honeysuckle azalea
Rhododendron viscosum	Swamp azalea
Rhus aromatica	Fragrant sumac
Ribes odoratum	Clove currant
Ribes sativum	Red garden currant
Ribes uva crispa	European gooseberry
Robinia pseudoacacia	Black locust

Table A.1. Continued.

Rudbeckia gloriosa	Gloriosa daisy
Salvia spp.	Sage and salvia
Sambucus racemosa	Red elderberry
Santolina spp.	Santolina
Sasa palmata	Chimaki sasa
Sasa pygmaea	Pigmy bamboo
Sassafras albidum	Sassafras
Scilla siberica	Siberian squill
Sedum spsectabile	Showy sedum
Solanum spp.	Nightshade
Stachys byzantina	Lamb's ear
Stokesia laevis	Stokes aster
Styrax japonica	Japanese styrax
Symphoricarpos albus	Snowberry
Syringa chinensis	Rouen lilac
Syringa reticulata	Japanese tree lilac
Syringia vulgaris	Garden lilac
Tagetes spp.	Marigolds
Taxodium distichum	Bald cypress
Thalictrum spp.	Meadow rue
Thuja spp.	Arborvitae
Thymus serphyllum	Mother of thyme
Thyme vulgaris	Common thyme
Torreya nucifera	Japanese torreya
Tradescantia virginiana	Spiderwort
Trillium spp.	Trillium, Wake-robin
Trollius laxus	Globeflower
Tulipa spp.	Tulip
Vaccinium stamineum	Deerberry
Vaccinium corymbosum	Northern highbush blueberry

Table A.1. Continued.

Vaccinium vacillans	Dwarf dryland blueberry
Vaccinium ngustifolium	Low sugar blueberry
Vaccinium macrocarpon	Large cranberry
Valeriana spp.	Valerian
Viburnum spp.	Viburnum
Vinca major	Periwinkle
Vitex negundo	Negundo chaste-tree
Yucca spp.	Yucca, Spanish bayonet
Zantedeschia spp.	Calla lily
Zanthoxylum americanum	Prickly-ash