

SPECIES: *Elaeagnus umbellata*

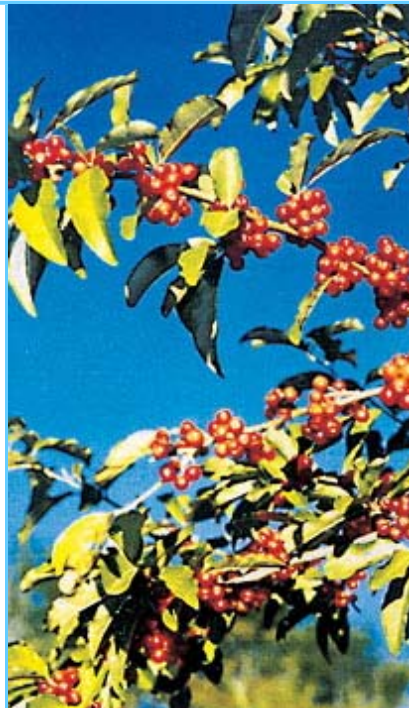
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INTRODUCTORY

SPECIES: *Elaeagnus umbellata*

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AUTHORSHIP AND CITATION:

Munger, Gregory T. 2003. *Elaeagnus umbellata*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2007, September 24].

FEIS ABBREVIATION:

ELAUMB

SYNONYMS:

No entry

NRCS PLANT CODE [\[66\]](#):

ELUM

COMMON NAMES:

autumn-olive

autumn olive

TAXONOMY:

The currently accepted scientific name for autumn-olive is *Elaeagnus umbellata* Thunb. (Elaeagnaceae) [\[5,18,19,29,38,46,48,51,57,71,75,77\]](#). Kartesz and Meacham [\[29\]](#) recognize the variety *Elaeagnus umbellata* Thunb. var. *parvifolia* (Royle) Schneid.

Several cultivars have been developed by the U.S. Department of Agriculture, Soil Conservation Service, and distributed for wildlife and other conservation uses (see [Importance To Livestock And Wildlife](#)) [\[1,8,10,23,25,65\]](#).

LIFE FORM:

Tree-shrub

FEDERAL LEGAL STATUS:

No special status

OTHER STATUS:

Autumn-olive is ranked as a "severe threat" (exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation) by the Tennessee Exotic Pest Plant Council [\[54\]](#). It is also ranked as a "severe threat" (exotic plant species which possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation; includes species which are or could become widespread in Kentucky) by the Kentucky Exotic Pest Plant Council [\[30\]](#).

Autumn-olive is listed among the top 10 exotic pest plants in Georgia [\[17\]](#), and among "highly invasive species" (species that may disrupt ecosystem processes and cause major alterations in plant community composition and structure and that establish readily in natural systems and spread rapidly) by the Virginia Department of Conservation and Recreation [\[69\]](#). It is listed as a Category II exotic plant species (considered to have the potential to displace native plants either on a localized or widespread scale) by the Vermont Agency of Natural Resources and The Nature Conservancy of Vermont [\[68\]](#), and as a noxious weed in several West Virginia counties [\[64\]](#).

U.S. Forest Service Region 8 ([Southern Region](#)) lists autumn-olive as a category 1 weed (exotic plant species that are known to be invasive and persistent throughout all or most of their range within the Southern Region and that can spread into and persist in native plant communities and displace native plant species and therefore pose a demonstrable threat to the integrity of the natural plant communities in the Region). The introduction of Category 1 Species is prohibited on National Forest System Lands [\[65\]](#).

DISTRIBUTION AND OCCURRENCE

SPECIES: *Elaeagnus umbellata*

- [GENERAL DISTRIBUTION](#)
- [ECOSYSTEMS](#)

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- [HABITAT TYPES AND PLANT COMMUNITIES](#)

GENERAL DISTRIBUTION:

Autumn-olive occurs throughout the eastern United States, from Maine, west to Wisconsin, Iowa, Nebraska, Kansas, Arkansas, and Louisiana, and south into Florida [[5](#),[9](#),[26](#),[27](#),[36](#),[38](#),[46](#),[51](#),[57](#),[63](#),[71](#),[75](#),[77](#),[78](#)]. It also occurs in southern and eastern Ontario [[4](#)] and Hawaii [[73](#)]. Kartesz and Meacham [[29](#)] recognize *E. umbellata* var. *parvifolia*, with the same distribution as autumn-olive.

Northern distribution of invasive autumn-olive populations in North America may be limited by cold intolerance from USDA climate zone 5 north [[55](#)], although one cultivar has been described as "hardy" to zone 6 [[25](#)]. Autumn-olive is native to Asia and was introduced to North America around 1830 [[5](#),[19](#),[51](#),[57](#),[65](#),[71](#),[77](#)].

The following biogeographic classification systems demonstrate where autumn-olive could potentially be found based on floras and other literature, herbarium samples, and confirmed observations. Predicting distribution of nonnative species is difficult due to gaps in understanding of their biological and ecological characteristics, and because they may still be expanding their range. These lists are speculative and may not be accurately restrictive or complete.

ECOSYSTEMS [[16](#)]:

FRES10 White-red-jack pine
 FRES11 Spruce-fir
 FRES12 Longleaf-slash pine
 FRES13 Loblolly-shortleaf pine
 FRES14 Oak-pine
 FRES15 Oak-hickory
 FRES16 Oak-gum-cypress
 FRES17 Elm-ash-cottonwood
 FRES18 Maple-beech-birch
 FRES19 Aspen-birch
 FRES21 Ponderosa pine
 FRES38 Plains grasslands
 FRES39 Prairie

STATES/PROVINCES: ([key to state/province abbreviations](#))

UNITED STATES

AL	AR	CT	FL	GA	HI
IL	IN	IA	KS	KY	LA
ME	MD	MA	MI	MS	MO
NE	NH	NJ	NY	NC	OH
PA	RI	SC	TN	VT	VA
WV	WI				

CANADA

ON

BLM PHYSIOGRAPHIC REGIONS [2]:

14 Great Plains

KUCHLER [34] PLANT ASSOCIATIONS:

K016 Eastern ponderosa forest
K065 Grama-buffalo grass
K067 Wheatgrass-bluestem-needlegrass
K069 Bluestem-grama prairie
K070 Sandsage-bluestem prairie
K073 Northern cordgrass prairie
K074 Bluestem prairie
K075 Nebraska Sandhills prairie
K077 Bluestem-sacahuista prairie
K081 Oak savanna
K082 Mosaic of K074 and K100
K083 Cedar glades
K084 Cross Timbers
K093 Great Lakes spruce-fir forest
K094 Conifer bog
K095 Great Lakes pine forest
K096 Northeastern spruce-fir forest
K097 Southeastern spruce-fir forest
K098 Northern floodplain forest
K099 Maple-basswood forest
K100 Oak-hickory forest
K101 Elm-ash forest
K102 Beech-maple forest
K103 Mixed mesophytic forest
K104 Appalachian oak forest
K106 Northern hardwoods
K107 Northern hardwoods-fir forest
K108 Northern hardwoods-spruce forest
K109 Transition between K104 and K106
K110 Northeastern oak-pine forest
K111 Oak-hickory-pine
K112 Southern mixed forest
K113 Southern floodplain forest
K114 Pocosin
K115 Sand pine scrub

SAF COVER TYPES [12]:

1 Jack pine
5 Balsam fir
12 Black spruce
13 Black spruce-tamarack
14 Northern pin oak
15 Red pine
16 Aspen
17 Pin cherry
18 Paper birch
19 Gray birch-red maple

- 20 White pine-northern red oak-red maple
- 21 Eastern white pine
- 22 White pine-hemlock
- 23 Eastern hemlock
- 24 Hemlock-yellow birch
- 25 Sugar maple-beech-yellow birch
- 26 Sugar maple-basswood
- 27 Sugar maple
- 28 Black cherry-maple
- 30 Red spruce-yellow birch
- 31 Red spruce-sugar maple-beech
- 32 Red spruce
- 33 Red spruce-balsam fir
- 34 Red spruce-Fraser fir
- 35 Paper birch-red spruce-balsam fir
- 37 Northern white-cedar
- 38 Tamarack
- 39 Black ash-American elm-red maple
- 40 Post oak-blackjack oak
- 42 Bur oak
- 43 Bear oak
- 44 Chestnut oak
- 45 Pitch pine
- 46 Eastern redcedar
- 50 Black locust
- 51 White pine-chestnut oak
- 52 White oak-black oak-northern red oak
- 53 White oak
- 55 Northern red oak
- 57 Yellow-poplar
- 58 Yellow-poplar-eastern hemlock
- 59 Yellow-poplar-white oak-northern red oak
- 60 Beech-sugar maple
- 61 River birch-sycamore
- 62 Silver maple-American elm
- 63 Cottonwood
- 64 Sassafras-persimmon
- 65 Pin oak-sweetgum
- 69 Sand pine
- 70 Longleaf pine
- 71 Longleaf pine-scrub oak
- 72 Southern scrub oak
- 73 Southern redcedar
- 74 Cabbage palmetto
- 75 Shortleaf pine
- 76 Shortleaf pine-oak
- 78 Virginia pine-oak
- 79 Virginia pine
- 80 Loblolly pine-shortleaf pine
- 81 Loblolly pine
- 82 Loblolly pine-hardwood
- 83 Longleaf pine-slash pine

84 Slash pine
85 Slash pine-hardwood
87 Sweetgum-yellow-poplar
88 Willow oak-water oak-diamondleaf (laurel) oak
89 Live oak
91 Swamp chestnut oak-cherrybark oak
92 Sweetgum-willow oak
93 Sugarberry-American elm-green ash
94 Sycamore-sweetgum-American elm
95 Black willow
97 Atlantic white-cedar
107 White spruce
108 Red maple
109 Hawthorn
110 Black oak
235 Cottonwood-willow
236 Bur oak

SRM (RANGELAND) COVER TYPES [52]:

601 Bluestem prairie
602 Bluestem-prairie sandreed
604 Bluestem-grama prairie
605 Sandsage prairie
606 Wheatgrass-bluestem-needlegrass
609 Wheatgrass-grama
611 Blue grama-buffalo grass
615 Wheatgrass-saltgrass-grama
801 Savanna
802 Missouri prairie
803 Missouri glades
804 Tall fescue
805 Riparian
808 Sand pine scrub
809 Mixed hardwood and pine
810 Longleaf pine-turkey oak hills
815 Upland hardwood hammocks
817 Oak hammocks

HABITAT TYPES AND PLANT COMMUNITIES:

Autumn-olive is found across many habitats in North America (see [Site Characteristics](#)), and may be associated with a variety of plant taxa, functional guilds and communities. As of this writing (2003), there is very little published information concerning habitat types and plant communities where autumn-olive might invade. Autumn-olive is not a climax dominant or indicator species in habitat type classifications.

Catling et al. [4] described the following habitats in southern and eastern Ontario where escaped autumn-olive was found most frequently: deciduous and mixed forests dominated by black oak (*Quercus velutina*), white oak (*Q. alba*), eastern white pine (*Pinus strobus*), and red maple (*Acer rubrum*); eastern redcedar (*Juniperus virginiana*) glades; prairie/savanna relicts dominated by indiagrass (*Sorghastrum nutans*); coniferous plantations; seasonally wet, "open floodplain thickets;" gravelly till in northern white-cedar (*Thuja occidentalis*) floodplain slope woodland; raised sandy knolls in open to sparsely shaded graminoid fens; and low sand dunes in eastern cottonwood (*Populus deltoides*) savanna.

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: *Elaeagnus umbellata*

- [GENERAL BOTANICAL CHARACTERISTICS](#)
- [RAUNKIAER LIFE FORM](#)
- [REGENERATION PROCESSES](#)
- [SITE CHARACTERISTICS](#)
- [SUCCESSIONAL STATUS](#)
- [SEASONAL DEVELOPMENT](#)

GENERAL BOTANICAL CHARACTERISTICS:

The following description provides characteristics of autumn-olive that may be relevant to fire ecology and is not meant to be used for identification. Keys for identifying autumn-olive are available (e.g. [5,18,38,46,51,71,77]). Photos and descriptions of autumn-olive are also available online at the [Invasive.org](#), [Invasive Plant Atlas of New England](#), and [The Nature Conservancy's Wildland Invasive Species Team](#) websites.

Autumn-olive is a many-branched, deciduous shrub or shrubby tree, growing 10 to 16 feet (3-5 m) tall [5,14,18,19,46,77]. Leaves are alternate [5,18,19,46,51,57], simple [19,46], and variable in size [19], ranging from 0.4 to 3 inches (1-8 cm) long and 0.4 to 1.6 inches (1-4 cm) wide [5,46,51]. Thorns several inches in length are formed on spur branches [55]. Autumn-olive fruits are single-seeded drupes, 0.2 to 0.4 inches (4-10 mm) in diameter, produced on pedicels [14,18,19,38,46,51,57].

Autumn-olive

forms root nodules induced by symbiosis with actinomycetes in the soil. This symbiosis permits the fixation and subsequent utilization of atmospheric nitrogen [42,61,71].

The biology and ecology of autumn-olive are not well-studied in North America. More research is needed to better understand autumn-olive's key biological traits, habitat requirements and limitations, and interactions with native North American flora and fauna.

RAUNKIAER [47] LIFE FORM:

[Phanerophyte](#)

[Geophyte](#)

REGENERATION PROCESSES:

As of this writing (2003) there is very little published information describing regeneration biology in autumn-olive. Research is needed to determine the precise nature of asexual regeneration, conditions that promote or constrain seedling establishment and early growth, and the role of soil-stored seed in autumn-olive invasiveness.

Breeding system: *Elaeagnus* spp. are [polygamodioecious](#) [5,19,41,74].

Pollination: Autumn-olive is open-pollinated [65], often by insects [41].

Seed production:

Mature plants can produce about 30 pounds (14 kg) of fruit annually. Thirty pounds of fruit is generally equivalent to about 3 pounds (1.4 kg) of seed, or about 66,000 seeds [65]. Under favorable conditions, autumn-olive can produce fruit by 3 to 5 years of age, usually at about 4 to 8 feet (1.2-2.4 m) in height. Fruit production is reduced by shading [1].

Seed dispersal: Seeds are dispersed by frugivorous birds and, to a lesser extent, small mammals [[11,37,40](#)].

Seed banking: No information

Germination:

Autumn-olive seed germination is enhanced by a period of cold stratification. Fowler and Fowler [[14](#)] determined germination rates for unstratified seeds were significantly ($p < 0.05$) lower than those receiving 8 or more weeks of cold stratification at 41 degrees Fahrenheit (5 °C). Optimal conditions for autumn-olive germination were 16-20 weeks of cold stratification followed by 2 weeks of night/day temperatures of 50/62 degrees Fahrenheit (10/20). These conditions resulted in >90% germination.

However, cold stratification is not a prerequisite for germination. Fowler and Fowler [[14](#)] found 51% of unstratified seeds germinated after 10 weeks of night/day temperatures of 50/62 degrees Fahrenheit (10/20 °C). Jinks and Ciccarese [[28](#)] found that >70% of seeds from their "control" group germinated after 8 weeks despite receiving no cold temperature treatment.

Seedling establishment/growth: No information

Asexual regeneration: Solecki [[53](#)] and Szafoni [[59](#)] indicated burned, mowed, and cut plants "resprout vigorously." The [Invasive Plant Atlas of New England](#) website [[37](#)] reports that if autumn olive is cut, "it resprouts abundantly," and burning only results in resprouting "from the stump." Russian-olive (*E. angustifolia*), another introduced and invasive *Elaeagnus* in North America, sprouts from the root crown and sends up root suckers (see FEIS botanical and ecological summary for Russian-olive).

SITE CHARACTERISTICS:

Autumn-olive has been planted throughout much of eastern North America for various purposes ([Management Considerations](#)), and has subsequently escaped into a variety of natural and seminatural habitats [[4,10,40,71](#)]. For example, [Invasive Plant Atlas of New England](#) [[37](#)] lists the following general habitats where autumn-olive may be found in New England: abandoned field, abandoned gravel pit, early-successional forest, edge, pasture, planted forest, railroad right-of-way, roadside, utility right-of-way, vacant lot, yard, or garden. It is probably most prolific on disturbed or ruderal sites [[5,8,26,40,77](#)].

Autumn-olive grows best on deep, relatively coarse-textured soils that are moderately-well to well drained [[1,65](#)]. It does less well on very dry soil and usually fails on very shallow, poorly drained, or excessively wet soil. Autumn-olive does not require highly fertile soil, and it appears to thrive equally well on soils ranging from "moderately acid to moderately alkaline" [[1](#)]. In Ontario, escaped autumn-olive is found in a variety of dry to mesic sandy, forested and open to sparsely shaded habitats, with soil pH from 5-7. It is most invasive in areas of dry sandy soils. Although it has been cultivated on fine-textured, periodically wet soils, it is generally not invasive on such sites in southern Ontario [[4](#)].

SUCCESSIONAL STATUS:

Autumn-olive appears best adapted to early-successional habitats in North America. It has been called "moderately" shade tolerant [[1](#)], but is thought to be generally absent from areas with very low light intensity, such as under a dense forest canopy [[40](#)]. Edgin and Ebinger [[11](#)] noted autumn-olive plants were restricted to "open canopy areas" within the interior of an "old-growth" forest along the Wabash River in southwestern Indiana. Based on this observation, they suggested autumn-olive is "not well adapted to low-light conditions."

The possibility of autumn-olive invasion in forested habitats should not be precluded on the basis of successional status. Ebinger and Lehnen [[10](#)] describe the following habitats in east-central Illinois where autumn-olive has invaded from nearby plantings: 1) a small plantation of pines (*Pinus* spp.), 3.3 to 6.6 feet (1-2 m) tall; 2) small ravines in the "early tree stage of succession," containing "scattered individuals" of black walnut (*Juglans nigra*), prairie crabapple (*Malus ioensis*), shingle oak (*Quercus imbricaria*), northern red oak

(*Q. rubra*), black cherry (*Prunus serotina*), and American elm (*Ulmus americana*), mostly less than 4 inches (10 cm) dbh; 3) a grazed upland forest dominated by white oak, mostly between 12 and 20 inches (30-50 cm) dbh. Data from sample plots (see table below) indicate autumn-olive stems were numerous within these sites, with a substantial proportion of plants greater than 20 inches (50 cm) tall. While it is difficult to draw firm conclusions from these and previous site descriptions without more detailed information, it appears autumn-olive has at least some ability to establish under a forest canopy.

Habitat	autumn-olive density (stems/ha)	proportion autumn-olive plants >20 inches tall
pine plantation	5,225	30%
hardwood ravine	33,975	20%
oak (<i>Quercus</i> spp.) forest	67,925	7%

Data adapted from Ebinger and Lehnen [10].

SEASONAL DEVELOPMENT:

The following table describes approximate flowering times reported from a variety of North American locations:

	February	March	April	May	June
Northeastern U.S. [18]				X	X
New England [37]			X	X	
Illinois [38]			X	X	
Florida [5]	X	X	X		
Blue Ridge Mountains [75]			X	X	
West Virginia [57]			X	X	
North & South Carolina [46]			X	X	

In the central and southern Appalachian regions, autumn-olive fruit ripens in August and September [46,57]. Fruit generally remains on the plant until late winter [14]. Autumn-olive generally produces leaves in early spring, prior to most native plants [55,59]

FIRE ECOLOGY

SPECIES: *Elaeagnus umbellata*

- [FIRE ECOLOGY OR ADAPTATIONS](#)
- [POSTFIRE REGENERATION STRATEGY](#)

FIRE ECOLOGY OR ADAPTATIONS:

Information about autumn-olive and fire is lacking. Research that examines the interactions of fire and autumn-olive, the effects these interactions may have on native communities and ecosystems and their respective fire regimes is needed.

Fire adaptations:

As of this writing (2003) there is no published information describing adaptations of autumn-olive to fire. It is likely, though speculative, that autumn-olive generally responds to fire damage by sprouting (see [Asexual regeneration](#)). Russian-olive (*E. angustifolia*), another introduced and invasive *Elaeagnus* in North America,

sprouts from the root crown following fire (see FEIS botanical and ecological summary for Russian-olive).

Fire regimes:

The following table lists fire return intervals for communities or ecosystems throughout North America where autumn-olive may occur. This list is presented as a guideline to illustrate historic fire regimes and is not to be interpreted as a strict description of fire regimes for autumn-olive. For further information on fire regimes in these communities or ecosystems see the corresponding FEIS summary for the dominant taxa listed below.

Community or Ecosystem	Dominant Species	Fire Return Interval Range (years)
maple-beech-birch	<i>Acer-Fagus-Betula</i>	> 1,000
silver maple-American elm	<i>A. saccharinum-Ulmus americana</i>	< 35 to 200
sugar maple	<i>A. saccharum</i>	> 1,000
sugar maple-basswood	<i>A. saccharum-Tilia americana</i>	> 1,000 [72]
bluestem prairie	<i>Andropogon gerardii</i> var. <i>gerardii</i> - <i>Schizachyrium scoparium</i>	< 10 [33,43]
Nebraska sandhills prairie	<i>A. gerardii</i> var. <i>paucipilus</i> - <i>Schizachyrium scoparium</i>	< 10
bluestem-Sacahuista prairie	<i>A. littoralis-Spartina spartinae</i>	< 10 [43]
plains grasslands	<i>Bouteloua</i> spp.	< 35
blue grama-buffalo grass	<i>B. gracilis-Buchloe dactyloides</i>	< 35 [43,76]
sugarberry-America elm-green ash	<i>Celtis laevigata-Ulmus americana-Fraxinus pennsylvanica</i>	< 35 to 200
Atlantic white-cedar	<i>Chamaecyparis thyoides</i>	35 to > 200 [72]
northern cordgrass prairie	<i>Distichlis spicata-Spartina</i> spp.	1-3 [43]
beech-sugar maple	<i>Fagus</i> spp.- <i>Acer saccharum</i>	> 1,000
black ash	<i>Fraxinus nigra</i>	< 35 to 200 [72]
cedar glades	<i>Juniperus virginiana</i>	3-7 [43]
yellow-poplar	<i>Liriodendron tulipifera</i>	< 35 [72]
wheatgrass plains grasslands	<i>Pascopyrum smithii</i>	< 5-47+ [43,45,76]
Great Lakes spruce-fir	<i>Picea-Abies</i> spp.	35 to > 200
northeastern spruce-fir	<i>Picea-Abies</i> spp.	35-200 [7]
southeastern spruce-fir	<i>Picea-Abies</i> spp.	35 to > 200 [72]
red spruce*	<i>P. rubens</i>	35-200
jack pine	<i>Pinus banksiana</i>	<35 to 200 [7]
shortleaf pine	<i>P. echinata</i>	2-15
shortleaf pine-oak	<i>P. echinata-Quercus</i> spp.	< 10
slash pine	<i>P. elliotii</i>	3-8
slash pine-hardwood	<i>P. elliotii</i> -variable	< 35
sand pine	<i>P. elliotii</i> var. <i>elliotii</i>	25-45 [72]
longleaf-slash pine	<i>P. palustris-P. elliotii</i>	1-4 [39,72]

longleaf pine-scrub oak	<i>P. palustris-Quercus</i> spp.	6-10
Table Mountain pine	<i>P. pungens</i>	< 35 to 200 [72]
red pine (Great Lakes region)	<i>P. resinosa</i>	10-200 (10**) [7,15]
red-white-jack pine*	<i>P. resinosa-P. strobus-P. banksiana</i>	10-300 [7,21]
pitch pine	<i>P. rigida</i>	6-25 [3,22]
pocosin	<i>P. serotina</i>	3-8
eastern white pine	<i>P. strobus</i>	35-200
eastern white pine-eastern hemlock	<i>P. strobus-Tsuga canadensis</i>	35-200
eastern white pine-northern red oak-red maple	<i>P. strobus-Q. rubra-Acer rubrum</i>	35-200
loblolly pine	<i>P. taeda</i>	3-8
loblolly-shortleaf pine	<i>P. taeda-P. echinata</i>	10 to < 35
Virginia pine	<i>P. virginiana</i>	10 to < 35
Virginia pine-oak	<i>P. virginiana-Quercus</i> spp.	10 to < 35
sycamore-sweetgum-American elm	<i>Platanus occidentalis-Liquidambar styraciflua-U. americana</i>	< 35 to 200 [72]
eastern cottonwood	<i>Populus deltoides</i>	< 35 to 200 [43]
aspen-birch	<i>P. tremuloides-Betula papyrifera</i>	35-200 [7,72]
black cherry-sugar maple	<i>Prunus serotina-A. saccharum</i>	> 1,000
oak-hickory	<i>Quercus-Carya</i> spp.	< 35
northeastern oak-pine	<i>Quercus-Pinus</i> spp.	10 to < 35
southeastern oak-pine	<i>Quercus-Pinus</i> spp.	< 10
white oak-black oak-northern red oak	<i>Q. alba-Q. velutina-Q. rubra</i>	< 35
northern pin oak	<i>Q. ellipsoidalis</i>	< 35
bear oak	<i>Q. ilicifolia</i>	< 35
bur oak	<i>Q. macrocarpa</i>	< 10 [72]
oak savanna	<i>Q. macrocarpa/Andropogon gerardii-Schizachyrium scoparium</i>	2-14 [43,72]
chestnut oak	<i>Q. prinus</i>	3-8
northern red oak	<i>Q. rubra</i>	10 to < 35
post oak-blackjack oak	<i>Q. stellata-Q. marilandica</i>	< 10
black oak	<i>Q. velutina</i>	< 35
live oak	<i>Q. virginiana</i>	10 to < 100 [72]
cabbage palmetto-slash pine	<i>Sabal palmetto-P. elliotii</i>	< 10 [39,72]
little bluestem-grama prairie	<i>Schizachyrium scoparium-Bouteloua</i> spp.	< 35 [43]
eastern hemlock-yellow birch	<i>T. canadensis-Betula alleghaniensis</i>	> 200 [72]
elm-ash-cottonwood	<i>Ulmus-Fraxinus-Populus</i> spp.	< 35 to 200 [7,72]

*fire return interval varies widely; trends in variation are noted in the species summary

**mean

POSTFIRE REGENERATION STRATEGY [\[56\]](#):

Tall shrub, adventitious bud/root crown

Ground residual colonizer (on-site, initial community)

Initial off-site colonizer (off-site, initial community)

Secondary colonizer (on-site or off-site seed sources)

FIRE EFFECTS

SPECIES: *Elaeagnus umbellata*

- [IMMEDIATE FIRE EFFECT ON PLANT](#)
- [DISCUSSION AND QUALIFICATION OF FIRE EFFECT](#)
- [PLANT RESPONSE TO FIRE](#)
- [DISCUSSION AND QUALIFICATION OF PLANT RESPONSE](#)
- [FIRE MANAGEMENT CONSIDERATIONS](#)

IMMEDIATE FIRE EFFECT ON PLANT:

There is some indication that autumn-olive is damaged by fire [\[37,53\]](#). However, there is no specific information available as of this writing (2003) describing the immediate effects of fire on autumn-olive.

DISCUSSION AND QUALIFICATION OF FIRE EFFECT:

No additional information is available.

PLANT RESPONSE TO FIRE:

Specific information about postfire regeneration is lacking, but published sources indicate that, in general, autumn-olive sprouts following stem damage [\[37,53,59\]](#). Solecki [\[53\]](#) and Szafoni [\[59\]](#) reported that autumn-olive "resprouts vigorously" following damage from fire.

DISCUSSION AND QUALIFICATION OF PLANT RESPONSE:

No additional information is available.

FIRE MANAGEMENT CONSIDERATIONS:

As of this writing (2003) it is unclear what impacts fire might have on invasive populations of autumn-olive or on communities where autumn-olive is invasive. Research is needed to determine the immediate effects of fire on autumn-olive, its ability to survive 1 or more fires, and its relative competitiveness in postfire communities.

It appears that autumn-olive will sprout in response to damage from fire, indicating a single burn is probably not sufficient to eradicate it [\[37,53,59\]](#). It is unclear how effective multiple prescribed burns might be for controlling invasive autumn-olive. While a single fire is unlikely to eradicate autumn-olive, periodic burning might control its spread and eventually reduce its presence. Any management activity that removes aboveground tissue, prevents seed production, and depletes energy reserves is likely to reduce autumn-olive invasiveness, especially when conducted persistently.

Postfire colonization via nearby seed sources seems likely (see [Seed dispersal](#)), provided there is enough light for seedling establishment in the postfire environment. However, more information is needed describing seedbed requirements for autumn-olive seed germination and seedling establishment.

Apart from questions about effectiveness of prescribed fire as an autumn-olive control measure, use of fire in areas where autumn-olive is present may or may not be appropriate, depending on management goals and the

particular ecosystem involved. Using fire to control autumn-olive in habitats where fire is infrequent may do substantial damage to fire-intolerant native species. Conversely, fire may be appropriate where management goals include maintaining native seral species or otherwise enhancing ecosystem structure and function through use of prescribed fire. For more information regarding fire effects on native flora, see the appropriate FEIS species summaries on this website.

MANAGEMENT CONSIDERATIONS

SPECIES: *Elaeagnus umbellata*

- [IMPORTANCE TO LIVESTOCK AND WILDLIFE](#)
- [OTHER USES](#)
- [IMPACTS AND CONTROL](#)

IMPORTANCE TO LIVESTOCK AND WILDLIFE:

Autumn-olive has been promoted as a beneficial wildlife species and planted in wildlife management areas in the eastern U.S. to provide food and cover [8,9,10,14,20,23]. Fruit remains on the plant until late winter (see [Seasonal Development](#)), potentially becoming an important wildlife food during periods of seasonal food scarcity [14]. Fruits are consumed by a variety of wildlife, including songbirds, northern bobwhite, ruffed grouse, mourning doves, ring-necked pheasants, wild turkeys, mallards, raccoons, skunks, opossums, and black bears [1,23,57]. Songbirds that eat autumn-olive fruit include: gray catbirds, hermit thrushes, wood thrushes, house finches, American robins, cardinals, cedar waxwings, common grackles, evening grosbeaks, fox sparrows, house sparrows, song sparrows, white-throated sparrows, mockingbirds, myrtle warblers, purple finches, rufous-sided towhees, starlings, tree swallows, and veerys [1,40,58]. Autumn-olive is also browsed by white-tailed deer [65].

Palatability/nutritional value: No information

Cover value: Autumn-olive provides cover for wildlife, especially songbirds, game birds, and rabbits [65].

OTHER USES:

Autumn-olive has been promoted for reclamation of mine spoils and other disturbed soils [1,13]. It has been planted for reclamation of surface coal mine sites because it is tolerant of low pH soil conditions often found on these sites [14,23,68]. It has also been suggested for use in stabilizing eroded soils in exposed coastal areas due to its salt spray tolerance [60]. An additional benefit to planting autumn-olive in these and other situations, where reclamation of disturbed and frequently nutrient-poor soils is an important objective, is its ability to [fix atmospheric nitrogen](#) [13,60].

Autumn-olive has been a recommended species for planting as a tall shrub component in windbreaks in the Great Plains, in part due to its wildlife food and cover value [20,65].

Autumn-olive is used in plantations for companion planting with black walnut to enhance black walnut productivity. It is thought autumn-olive enhances black walnut growth by increasing ecosystem nitrogen pools through [nitrogen fixation](#) and by decreasing herbaceous competition [44,49,50,61,69]. Field experiments have demonstrated that interplanting autumn-olive with black walnut can increase seasonal soil nitrogen mineralization rates [42], significantly ($p < 0.01$) increase black walnut leaf nitrogen concentration [70], and substantially improve black walnut growth and yield [6,42,44,44,70], compared with growing black walnut alone. Interplanting autumn-olive may also indirectly enhance black walnut growth and yield by reducing incidence of leaf fungal diseases through interactions with fungivorous microarthropods in the litter layer [31,32]. White ash (*Fraxinus americana*) growth and yield also increases when interplanted with autumn olive

[44].

IMPACTS AND CONTROL:

Impacts:

In general, invasive autumn-olive impacts native biotic communities in eastern North America by displacing native plants. Invasive populations can supplant native habitat, sometimes forming dense thickets. Prodigious seed production and widespread seed dispersal by frugivorous birds probably contribute to its invasiveness [55]. An Illinois study reported autumn-olive concentrations of 5,225 stems per hectare in a pine plantation, 27,500 stems per hectare in a grazed upland woods, and 33,975 stems per hectare in hardwood-dominated ravines [10]. Autumn-olive densities of 125,000 plants hectare were recorded in the understory of a yellow-poplar-sweetgum plantation in southwestern Indiana in 2000. This population was established from nearby plantings in the early 1970's. Although 90% of these individuals were 2 feet (0.6 m) or less in height, they formed "a nearly impenetrable thicket" and were "commonly the only understory species present" [11].

Nestleroad and others [40] have suggested that impacts of invasive autumn-olive may be greatest in communities adapted to infertile soils, where its nitrogen-fixing capabilities might confer substantial competitive advantage against native species. It is conceivable that autumn-olive could alter the nitrogen cycle in "infertility-dependent" natural communities, shifting the potential native community on these sites. Nestleroad and others [40] expressed concern that natural communities of sandy, infertile habitats in southern and eastern Ontario, and throughout the Great Lakes region, are already seriously impacted by other pressures.

Control:

Controlling invasive autumn-olive may require frequent monitoring and repeated treatments to achieve success. Because seeds can be dispersed long distances by birds, it is helpful to eradicate autumn-olive populations in areas surrounding the threatened area, when possible. If the infested area is large, or if eradication of surrounding populations is not feasible, land managers may wish to focus control efforts in the most ecologically significant and/or least invaded areas first. In closed-canopy forests, control can likely be achieved through routine monitoring and eradication of new individuals by hand pulling or [spot-spraying](#) with herbicide [11].

Prevention:

Where appropriate, maintaining dense, frequently mowed grass or other dense native vegetation can help prevent establishment of autumn-olive seedlings [40].

Integrated management: No information

Physical/mechanical:

Hand pulling young seedlings and sprouts can be effective, particularly from moist soil [53,59]. Seedlings are easiest to identify in early spring because autumn-olive produces leaves earlier than most native shrubs [55,59]. Mowed or cut plants reportedly "resprout vigorously" [53,59], so these methods alone will probably not effectively control mature plants. Even repeated cutting is apparently ineffective without treating stumps and/or resprouts with herbicide [53]. Treating cut surfaces with glyphosate is an effective control measure and can minimize negative impacts on native vegetation when carefully applied (see [Chemical control](#)) [53,59].

Fire: See [Fire Management Considerations](#).

Biological: No information

Chemical:

Several herbicides have been used alone or in combination to provide effective control of autumn-olive, including glyphosate, triclopyr, 2,4-D, and dicamba. This is not intended as an exhaustive review of chemical control methods. For more information regarding appropriate use of herbicides against invasive plant species

in natural areas, see [The Nature Conservancy's Weed Control Methods Handbook](#). For more information specific to herbicide use against autumn-olive, see [The Nature Conservancy's Element Stewardship abstract](#) for autumn-olive or the [Connecticut Invasive Plant Working Group \(CIPWG\)](#) or [Illinois Nature Preserves Commission](#) websites.

Dicamba and 2,4-D have been used as a foliar application to effectively control autumn-olive [[35](#),[53](#),[59](#)]. Triclopyr has also been used effectively on resprouts following cutting [[53](#)]. Because this method is conducted during the growing season, and because 100% coverage of foliage is recommended for most effective control, Szafoni [[59](#)] suggests that foliar application is best suited to shorter plants.

For larger plants, basal-bark application of triclopyr or 2,4-D can control invasive autumn-olive [[11](#),[35](#),[53](#)]. Basal-bark treatment is the application of herbicide solution directly to the bark the lower portion of woody plants. Herbicide then penetrates the bark and is absorbed by the plant [[53](#)]. Rather than a broad band application, a thin line of herbicide applied around the entire circumference of the stem 6-12 inches (15-30 cm) above the ground is sufficient, and less likely to harm nearby, desirable plants [[53](#),[59](#)].

Direct application

of glyphosate to cut stumps can also be effective, particularly late in the growing season (July-September) [[53](#),[59](#)]. According to Szafoni [[59](#)], reduced application rates of 10-20% solution (compared with 50-100% recommended on some glyphosate product labels) are sufficient for effective treatment of cut stems. Careful application of herbicide directly to target plants can reduce damage to nearby, desirable vegetation [[59](#)].

Multiple herbicide treatments may be required to completely kill all plants. Edgin and Ebinger [[11](#)] describe treating an invasive population of autumn-olive in Illinois with basal-bark applications of triclopyr during springs of 1996 and 1997. A subsequent search in early summer 1997 yielded no evidence of live autumn-olive in treated areas. But by 2000, autumn-olive had re-established within these same treated areas. Because a dense population of well-established autumn-olive remained in an area adjacent to treatment plots, many of the newly established plants were assumed to have originated from the seed bank or from seeds transported into the plots by birds after herbicide treatments. But nearly 11% of the larger stems (2.6 to 4.9 feet (80-150 cm) tall) had an "enlarged basal caudex" and were considered to be resprouts that were only top-killed by the herbicide treatment.

Cultural: No information

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