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AUTUMN OLIVE IN ILLINOIS CONSERVATION PRACTICE

Illinois Department of Conservation
Division of Planning and Information
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INTRODUCTION

Due to the increasing level of controversy concerning the use of Autumn Olive (and certain other introduced trees and shrubs) in Illinois and elsewhere, an analysis of the plant and its associated benefits and problems provides a basis for recommendations regarding potentials and limitations for its use. While this discussion is focused on the example of Autumn Olive, similar consideration should be given to Tatarian Honeysuckle, Amur Honeysuckle, Chinese Chestnut, European Black Alder, Amur Maple, Osage Orange, Sawtooth Oak, Paulownia, and other species which are proven performers in the field, but which have demonstrated, or potentially possess, some of the same objectionable qualities as Autumn Olive.

DESCRIPTION

Autumn Olive (*Elaeagnus umbellata* Thunb.) is a large multi-stemmed shrub, reaching 18' in height and 25' in spread, with individual stems exceeding 8" in diameter in Illinois under ideal site conditions. The plant freely develops basal sprouts, especially following injury. Its branches are irregularly armed with strong, sharp thorns, produced when the terminal buds of lateral shoots abort, resulting in the formation of pointed spurs up to several inches long (similar to those found in certain *Malus* and *Pyrus* species). Autumn Olive is one of the earlier deciduous shrubs to break dormancy in Illinois, beginning to develop foliage in mid-March in southern Illinois and advancing northwards with the season approximately 100 miles per week. Fully grown leaves are 1½"-3" long, arranged alternately. The leaves are bright green above and silver green with brown scales below, conspicuous because of their overall light color and the fact that they produce a shimmering appearance when windblown. In autumn the leaves turn dull yellow or drop without developing effective fall

coloration. The bark on large (5" diameter or more) stems is gray-brown and lightly furrowed; plants typically attain this size and appearance in Illinois after about 10 years of growth on favorable sites. Smaller stems and older branches are smooth brown, while twigs are lighter with speckled bark and brown pith. Flowers are perfect or polygamous, axillary, usually clustered, four-lobed, light yellow and fragrant, about 1/2" long by 1/4" wide. The blooming period in Illinois occurs in late April and May, after the initial leaves are developed. Fruits are single-seeded fleshy drupes, 1/4" in diameter, silvery with brown scales, ripening to speckled red in September or October and gradually withering after frost. Most of the fruits are eaten by birds or fall to the ground by early winter. The fruits range in taste from astringent to semisweet, varying between individual plants; at least some are palatable enough to be used for human consumption in Japan. The plants reach sexual maturity in about 5 years and, while 30%-40% of a plantation is often fruitless in any given year, individual plants bear up to 80 pounds of fruit per plant, or about 200,000 seeds.

BACKGROUND

Autumn Olive has been grown in cultivation since 1830, when it was first collected from its native range, and has been available commercially in the United States since 1917. Its natural habitat includes streambanks and thickets up to 9000' in elevation, from Afghanistan to China, Korea, and Japan. In 1940 the United States Soil Conservation Service (S.C.S.) National Plant Materials Center in Beltsville, Maryland initiated a field testing program which resulted in the release in 1963 of strain #BN-270 from the Himalayas. This strain, released under the name 'Cardinal', had been selected for fruit production and hardiness, and was distributed for conservation planting by S.C.S. Plant Materials Centers (P.M.C. s) throughout its potential adaptive range. The initial stock obtained by the Illinois Department

of Conservation was supplied to the Union County Nursery in 1964 by the P.M.C. at Elsberry, Missouri. Subsequently the hardier strain, #MI-777, was acquired and seed production plantings of one or both strains initiated. Within a few years the State was growing and distributing over 1,000,000, Autumn Olive seedlings per year (about 20% of the State Nursery production of all other species combined). By 1982 Illinois had already grown and distributed enough Autumn Olive to hypothetically cover 40-50 square miles at 10-foot spacing.

VALUE

There are several factors leading to this dramatic, almost instantaneous popularity. Although the species prefers light, fertile, well drained soils, it will survive almost any soil and moisture condition in Illinois capable of sustaining woody plant growth. Autumn Olive easily overcomes competition from other shrubby or herbaceous species, and tolerates moderate shade (with consequent reduction of fruiting and growth density). It rebounds from browsing damage or mechanical injury to the top growth, and tolerates a wide range in soil pH and moderate contamination of the root zone by road salt and heavy metals. Both the 'Cardinal' strain and the improved #MI-777 exhibit excellent initial survival in field planting, and develop rapidly into mature plants. Personal observation over ten years of both strains planted at the same site indicates that strain #MI-777 may be hardier but slower growing.

Because they propagate readily from seed and softwood or hardwood cuttings, can be field planted as 1-0 stock, and are easily adapted to nursery production, large quantities of young Autumn Olive plants are made available with relatively little effort or expense. The roots are nodulated with symbiotic actinomycete endophytes capable of fixing gaseous nitrogen into the soil (similar to alders and legumes), a

condition which enables the plant to colonize and improve sterile soil areas such as mine spoils, borrow pits, and blow sand. This nitrogen fixing capability, together with its limited ultimate size, makes it suitable as a companion species for interplanting as a nurse crop with hardwoods such as walnut, which require more fertile soil for acceptable growth than is commonly available for commercial reforestation in Illinois. Rapid growth and site adaptability, herbicide resistance, fiber content, and potential for short-rotation coppice management in high-density plantations also make the species very promising in University of Illinois field testing for biomass production. Because of its rapid establishment and conspicuous coloration, Autumn Olive makes a highly visible boundary marker in border plantings, and its dense, often thorny growth adds to its value as a physical barrier in fencerows. The Illinois Department of Transportation finds it ideal for highway crash barriers due to its reflective coloration, growth rate, density, and recovery from mechanical injury. Bernie Hayes in the American Bee Journal also recommends the plants for nectar production, "since they are available from tax-supported conservation departments," thus requiring minimal personal expense on the part of apiarists for a plant with suitable flowering characteristics.

Much of the Autumn Olive grown in Illinois is distributed for enhancement of wildlife habitat. Since the use of Multiflora Rose was discontinued several years ago, Autumn Olive (in combination with a minor component of "Bush" Honeysuckle) has become the main species that many biologists rely upon for high survival, rapid growth, early and heavy fruit production, and broad site adaptability. It gives visible results within a short enough time frame that its success is readily apparent to laymen observing the planting and subsequent growth, a fact which provides a valuable public relations element for wildlife management programs as well as providing wildlife food and cover. Recent research by R. Robel and N. Browning in

Kansas found Autumn Olive second only to rose in use by birds, among 32 shrub species examined in a controlled situation.

CONCERNS

Many of the species, hybrids, and varieties of plants introduced into cultivation on a large scale tend to share some common disadvantages. Some of these problems are inherent within the plant while others are brought about or aggravated by indiscriminate or injudicious use of the plant. The more common concerns are summarized below, with an evaluation of the extent to which each can be applied to Autumn Olive.

1. Aesthetic

Plants introduced from foreign environments frequently have evolved morphological traits, often individually attractive, which nevertheless set aliens apart visually from native species. The light green and silvery foliage color (common to many plants which have adapted to high elevations and/or poor soils and droughts) and the drab fall color (common to many plants of south-temperate or Eurasian origin) combine to prevent the aesthetic adaptation of Autumn Olive to the native landscape of Illinois. The species is conspicuously out of character in a natural setting, throughout spring, summer, and autumn. This problem usually is intensified by the practice of planting in rows or other unnatural patterns, reinforcing the manipulated appearance to the observer who might not otherwise correctly interpret the abnormal color of the plant as a possible indication of its alien origin. This concern is illustrated by comments received from park visitors who notice the plantings. While the aesthetic concern is more philosophical and usually misunderstood or underrated, it is important to remember that the visual quality of key areas of the

undisturbed native landscape is the original foundation of state and national park systems, a fact recognized by most park agencies.

2. Genetic

Exotic species which are planted near native species from the same genus have the potential to genetically contaminate the native populations, if they are sexually compatible and their flowering times coincide. While this might produce hybrids of cultural value in a controlled situation, large scale interbreeding in the wild is potentially one of the most serious long-term threats to our native ecosystem from extensive planting of exotic species. The closest Illinois relative of Autumn Olive is a rare species of Shepherdia confined to the Lake Michigan shoreline, thus this concern does not significantly apply to Autumn Olive; it is much more critical with species such as Sargent Crab which are members of genera with widespread native components known to hybridize freely.

3. Insects/Disease

Introduced species sometimes are abnormally susceptible to decimation by insects or diseases in their adopted area. This situation is occurring with borers and nematodes on Scotch Pine, aphids on Tatarian Honeysuckle, scab and rust on several hybrid oriental crabapples, etc. Disease has been reported as a problem with plantations of Autumn Olive as well. Floyd Giles of the University of Illinois believes a systemic Verticillium wilt is killing Autumn Olive statewide. In addition, he and Staff Forester Don Howerton of the State S.C.S. office have found canker problems on many plantings. Pathologist Eugene Himelick of the Illinois Natural History Survey has not isolated

Verticillium albo-atrum from Autumn Olive, but confirms widespread damage due to Phomopsis cankers, probably related to cold temperature injury. Observations of diseased Autumn Olive in Christian, Macon, Sangamon, and Menard counties indicate that the pathogens can spread rapidly, killing entire plantations. LaFayette Home Nursery in northwestern Illinois abandoned attempts to grow Autumn Olive in 1976 after battling diseases for six years, and James Durell of the Kentucky Division of Game has found the species so disease-prone that plantings seldom are effective for wildlife beyond 6-8 years.

As is common with introduced species, Autumn Olive did not initially exhibit any signs of disease susceptibility, and was widely planted due in part to its supposed pest resistance. It is now following in the path of its ailing relative, Russian Olive, and serious diseases are beginning to eliminate many plantings. Local wildlife populations have grown to depend on this alternative habitat species. This is particularly ironic in that species other than Autumn Olive could initially have been established.

4. Hardiness

Plant species or ecotypes which have been indigenous in a particular soil and climate zone over many generations are well adapted to occasional extremes of weather, showing no damage or rapid recovery from temperature or moisture stress. The 'Cardinal' strain of Autumn Olive, originally selected for fruit production and hardiness, is now proving to be marginally adapted to severe winter conditions in Illinois. Dieback (with subsequent regrowth) and winterkill (with no regrowth) have become so significant in northern Illinois since the 1978 onset of an apparent cold winter climate cycle that Don Howerton no longer recommends Autumn Olive for use north of Effingham on the basis of

winter damage. Don Cummings of the Iowa Division of Wildlife likewise has found that Autumn Olive is so prone to total winterkill in northern Iowa that, after 20 years of field trials, it has been decided that the plant will in the future be used only sparingly and then only south of Interstate 80. Eugene Woehler, Research Wildlife Biologist for the Wisconsin Department of Natural Resources, has observed variable dieback in Wisconsin, depending upon plant age, genetic strain, and temperature severity. David Funk reported that a substantial winter dieback occurred in eastern Missouri in 1974, and James Henry, Director of the Elsberry P.M.C., notices winter injury at Elsberry after many severe winters.

5. Introduced Disease and Insect Problems

Early in this century, the importation of oriental chestnut trees carrying Endothia bark blight precipitated a natural and economic disaster of massive proportions. While research into hypovirulent, virus-inhibited strains of the fungus may eventually allow a token restocking of American Chestnut, the damage in practical terms is total and long term. We have lost several of our native elm species to another vascular fungus (Ceratocystis ulmi, Dutch Elm Disease), that also was introduced (and transmitted) via importation of alien species. The recent epidemic outbreaks of Gypsy Moth and Russian Honeysuckle Aphid are insect problems of similar origin.

Diseases and insects are part of any natural system, but the sudden exposure of these pests to a new ecosystem which has not had the opportunity to evolve resistance or counter measures in the form of natural enemies can lead to a drastic and chaotic realignment of that system. We have seemingly passed this hurdle with Autumn Olive without incident. However, just as large scale

planting of Chinese Chestnut may serve as a reservoir of virulent fungus strains (as well as genetic contamination) which might complicate any efforts toward reintroduction of American Chestnut, the mass distribution of a relatively untested species such as Autumn Olive, which already is exhibiting some tendencies toward disease susceptibility, may prove to be a pathological problem. The potential is apparently minimal at this time, but should not be discounted.

6. Monoculture

The weaknesses of monocultural resource management are well documented. Monocultures favor target wildlife species instead of wildlife communities, and the risk of disaster for the target population is proportionate to the size of the monoculture, the overall importance to the target, the degree of vulnerability (to insects, disease, climate) of the specific plant species involved, and the time required for the management cycle (i.e., annual, perennial, shrub, tree, etc.). The risk can be minimized (sometimes at cost to optimum production) by breaking up the monoculture, by using less vulnerable habitat species or varieties, by managing in a shorter cycle, or by limiting the extent of management intervention to a level less critical to the success of the objective.

In the case of conservation reforestation and wildlife shrub habitat enhancement, the management cycle can be very long term and management intervention is often critical. Therefore, use of habitat species such as Autumn Olive with apparent pathogenic vulnerability of unknown proportion should be minimized, and the use of any monotypic planting should be avoided, regardless of species. In this context, Autumn Olive would be suitable as a minor component of a

conservation planting if other objections to its use were overcome, but it should not continue in its frequent role as the primary (or only) species in any planting. Resource management staff are highly educated biologists who should be able to apply their biological training toward the scientific prescription of diverse habitat development rather than the monotypic use of any species, whether native or introduced. This should be encouraged, and the biologists should be supplied with a reasonable palette of suitable species with which to work, thus removing any reason to pursue a monocultural approach. The professional image of conservation agencies can only be injured by the potential collapse of plantings which lack diversity, and by the reduction of non-target wildlife species which might require such diversity.

7. Wildlife Value

Since the majority of the Autumn Olive propagated in Illinois is distributed for wildlife habitat enhancement (i.e., food and cover), it seems logical to assume that the species has exceptional wildlife value. For example, for the 1982 field planting season Illinois State Nurseries had 1,050,000 Autumn Olive seedlings available for distribution, along with only 50,000 Gray Dogwood, 3500 American Hazelnut, 800 Highbush Cranberry, etc. (all valuable wildlife plants). This proportion, coupled with 20 years of promotion by the Soil Conservation Service, would seem to indicate that Autumn Olive is the best species available for wildlife use.

Several knowledgeable people are beginning to express doubts about this alleged value. Paul Nelson advises that the Missouri Parks Division does not use Autumn Olive, instead managing for wildlife by manipulating native species through planting, cutting, or burning. According to James Durell, his wildlife

program in Kentucky relies mostly upon various Lespedeza species and native species, since Autumn Olive is not dependable over the long term. Don Cummings and his staff in Iowa are avoiding Autumn Olive for similar reasons, leaning instead upon such species as dogwoods, ninebark, honeysuckles, viburnums, and specialty plantings such as apples for deer.

A check of S.C.S. publications Invite Birds to Your Home and Plant Materials for Conservation indicates that Autumn Olive is used by 15 species of birds, but the former publication shows double and triple that amount of use for dogwoods, crabapples, elderberries, viburnums, cherries, and other native species; of 17 species listed, Autumn Olive ranks 15th in bird use. Steve Brady, State Wildlife Biologist for S.C.S., is turning toward mixtures of native species and several crabapples with persistent fruit in his planting recommendations.

Autumn Olive research by Dale Birkenholz of Illinois State University at the Parklands Foundation's Mackinaw Area has shown that older plantings may not be consistent in fruit production. He cites heavy fruiting on only 27% of a sample of 232 plants, with 38% completely fruitless. He has also noted bird preference for cherries and other species over Autumn Olive where both were available, an observation which supports the evaluation in the S.C.S. publication mentioned earlier. He is concerned that Autumn Olive fruit is available mostly in the fall, when food is not a limiting factor to wildlife, and suggests that plantings of dogwoods, small fruited hawthorns, and other plants with more durable fruit would be more useful to wildlife during critical periods in the winter. He also reinforces the need for more diversity in wildlife plantings and for more concentration on the use of native species.

Glen Sanderson, in charge of wildlife research for the Illinois Natural History Survey, recommends avoiding large plantings of Autumn Olive in favor of mixed plantings of native species and managing for natural succession. He also feels that the traditional row plantings of Autumn Olive around dove management areas result in a high rate of crippling loss, and recommends that if Autumn Olive is used at all it should be planted in small clumps. He echoes concerns raised by Birkenholz about the lack of winter value of Autumn Olive.

William Southern of the Northern Illinois University Department of Biological Sciences believes that the overall value of Autumn Olive to wildlife is overrated. He notes a selective feeding and nesting preference for native plants such as hawthorns when Autumn Olive is not the only species available. He further believes that the widespread acceptance of Autumn Olive by wildlife biologists was achieved on the basis of horticultural characteristics rather than its wildlife value. He is convinced that native species should be recommended for wildlife plantings unless no other choice but Autumn Olive is available, and then that the use of Autumn Olive should be limited to areas where no other cover exists.

Through personal communication and a survey conducted by Dave Klinedinst, several Illinois Department of Conservation District Wildlife Managers have indicated that while they may or may not question the relative wildlife value of healthy Autumn Olive compared to other plants, they find that value to be compromised by lack of winter hardiness. These biologists also express concern over the lack of diversity in monotypic plantings, and a desire to see a greater variety of native wildlife plants become available for use in food and cover plantings.

It should not be inferred from these comments that Autumn Olive no longer has strong support within the wildlife management profession. Those who still swear by it probably outnumber those who question it. The species was not a major part of the Illinois wildlife management program until about 12 years ago, however, and many highly qualified people already have begun to be concerned more about its problems than its value.

8. Department Mission

The objectives and powers of the Illinois Department of Conservation are defined by a series of State Statutes. Direct or indirect pertinence to Autumn Olive can be found in the following:

Chapter 61,	Section 1.10	(management of birds & mammals)
	Section 1.12	(modern habitat management methods)
Chapter 96½,	Section 5901-1	(management of all state forests)
	Section 5905-4	(timber management of state forests)
	Section 5907-6	(nurseries-tree propagation and use)
	Section 5908-6.1	(designation of nurseries)
	Section 6104-4	(management and sale of forest products)
Chapter 105,	Section 465-1	(management of all state parks)
	Section 465A-1A	(management of all nature preserves)
	Section 467-3	(maintain original character)
	Section 468-4	(replant with indigenous species)
Chapter 127,	Section 63A1	(fish and game management measures)
	Section 63A2	(fauna & flora management measures)
	Section 63A8	(promotion of forestry)

Some license for management may be assumed under Chapter 127 Section 63A-2 and Chapter 61 Section 1.12, which basically charge the Department with responsibility for using "the most modern conservation methods" for managing wildlife. This would seem to authorize the use of Autumn Olive since it has been generally recognized as meeting those criteria. However, the general intent of the statutes is clarified in Chapter 105 Section 467-3, "In maintaining the State parks and nature preserves the Department of Conservation shall conserve the original character as distinguished from the artificial landscaping of such parks and nature preserves," and in Chapter 105 Section 468-4, "The Department of Conservation has the power. . . to replant any devastated native plant areas of any State park or increase or supplement the same when necessary with plant material indigenous to such park." While this legislation is located in a chapter authorizing State parks and nature preserves in general, and therefore does not legally restrict the mass use of non-native species such as Autumn Olive on other property classifications, the wording certainly encourages management of native ecosystems as opposed to exotic plantations, which are frequently monocultural and established in unnatural planting patterns.

9. Spontaneous Regeneration

Unwanted reproduction is the predominant concern which has cost hundreds of millions of dollars for control of various exotic species worldwide. This is also the factor which has generated noxious weed laws and has precipitated bans on several exotic species in many states, including Multiflora Rose in Illinois and elsewhere. According to R.D. Henry and A.R. Scott of Western Illinois University, 811 species comprising 29% of the spontaneous flora of Illinois are of alien origin, including over 100 woody species. The majority of these woody species have become naturalized within the past 60 years, including

Autumn Olive, Multiflora Rose, Amur Honeysuckle, Japanese Honeysuckle, Tatarian Honeysuckle, Chinese Chestnut, Bristly Locust, and other species which were introduced and mass planted "for conservation purposes" as part of State or Federal programs. (Herbaceous exotics follow a similar pattern, with such species as Kudzu and Johnson Grass.) The potential economic and ecological impacts of many of these species which are spreading from cultivation have not yet been realized, but the costs of control already are awesome.

Regardless of premature claims to the contrary, Autumn Olive has the potential to become one of the most troublesome adventive woody plants in the central and eastern United States. Prolific fruiting, rapid growth, and site adaptability, coupled with avian seed dissemination, seemingly provide all of the qualities this species needs to become epidemic.

Personal observation has established the following:

1. Menard County, 1981-82 - volunteers have been found spreading from seed sources 3/4 mile distant: 100 seedlings, 1-3 years old, were uprooted from a 1/4 acre sample of brushy pasture; scattered seedlings, 1-2 years old, from a closed canopy forest with native understory; 12 seedlings, 1-3 years old, from a one square yard sample plot of 3' - high mowed turf (the seedlings had repeatedly been cut back and were growing procumbently);
2. Sangchris Lake, 1982 - Spot checks located scattered reproduction from 'Cardinal' and MI-777 strains planted between 1969 and 1971, with volunteers in certain sample areas as dense as 10,000 per acre - approximate ages of the reproduction ranged from 1-4 years;

3. Giant City, 1981-82 - Scattered reproduction has been noted in open areas throughout the park; the plants range up to 4-5 years old and some have stems exceeding 2" in diameter, with certain old field areas so densely covered as to be impassable to pedestrians;
4. Red Hills, 1980 - Dense reproduction is present in many areas, in excess of 6 years old - this was the first location that spontaneous regeneration of this species was noticed by Department of Conservation staff in Illinois;
5. Ramsey Lake, 1982 - Dense reproduction 1-3 years old, averaging up to 2 plants per square yard, is established in sod under a closed mature White Oak canopy, approximately 50 yards from possible seed sources;
6. Little Black Slough, 1980 - Scattered reproduction was noticed in openings covering large areas on Boss Island, from plantings elsewhere on the Island. While densities, distances, ages, etc., were not determined, volunteers were noticeably abundant;
7. Ozark Hills Nature Preserve, 1981 - Scattered individuals up to approximately 5-6 years old were observed in the nature preserve under closed canopy forest conditions in an otherwise natural understory, up to 1/4 mile from possible seed sources.

Dale Birkenholz has researched the spread of Autumn Olive by robins under controlled conditions, and has found that most of the seeds are regurgitated intact before they pass through the digestive tract. This accounts for high degrees of

viability for bird-distributed seed. However, some of the seeds which do pass through the birds also remain viable, which potentially provides for dissemination over far greater distances. Within the past year Birkenholz has observed substantial reproduction of Autumn Olive at the Mackinaw Area, more than 200 meters from the nearest source, in grass sod under broken shade.

Conversations with District Heritage Biologist Andy West, Regional Fish and Wildlife Manager Mike Carter, Regional Interpreter Cem Basman, and several site superintendents confirm that Autumn Olive reproduction is becoming serious in southern Illinois. Similar reports have been heard from Conservation Staff in central Illinois. Personal communications have also been received within the past year from private landowners (e.g. Judge Laurence Arnold of Olney, nurseryman Henry Eilers of Litchfield) expressing deep concern over the uncontrolled spread of Autumn Olive and Tatarian Honeysuckle in private hunting preserve land, nursery fields, Christmas tree plantations, lake shore, fencerows, and an Audubon Society sanctuary. Larry Stainton and Wayne Tipword of the Illinois Department of Transportation have received so many complaints from landowners whose property is being invaded adjacent to highway plantings that they are dropping the species from future planting plans.

Clark Ashby of Southern Illinois University reports that Autumn Olive seems to be following the same sequence as Japanese Honeysuckle in southern Illinois. For many years following introduction, no reproduction is apparent; then the species suddenly explodes, becoming epidemic in a few years. According to the 1979 Book, Trees, Shrubs, and Vines for Attracting Birds by R. DeGraaf and G. Witman, Autumn Olive had already established volunteer thickets by 1979 from Maine to New Jersey and Pennsylvania. This problem now surrounds Illinois as well. John Bacone

of the Indiana Department of Natural Resources reports Autumn Olive invasion of nature preserves, and Duane Shroufe of the Indiana Division of Fish and Wildlife is receiving so many complaints of Autumn Olive spreading into pastures and fencerows that he now uses it only in intensively managed row-crop areas. Sam Kirby of the Missouri Game Division has found Autumn Olive thickets in the mudflat zone of flood control reservoirs where few other species can survive. Research conducted by Darrell Morrison and Signe Holtz of the University of Wisconsin on a farm southwest of Madison, initiated following observation of spontaneous reproduction by Professor E. R. Hasselkus at the University of Wisconsin Arboretum, has led to a one year moratorium on Autumn Olive use by the Wisconsin Department of Natural Resources and initiation of a program to monitor future spreading. West Virginia has already added Autumn Olive to the State Noxious Weed list, and S.C.S. Biologist Rick Heayslip of Pennsylvania reports that a similar bill was recently withdrawn from the Pennsylvania General Assembly based upon a compromise with State game officials which so restricted subsequent distribution of the species that 10 acres of 1 year old Autumn Olive in nursery seedbeds were plowed under this year at State Nurseries because they could not be used.

Perhaps the most documented study of Autumn Olive reproduction in Illinois to date was conducted in 1981 by John Ebinger of Eastern Illinois University. His survey at sample sites in Coles County found numerous seedlings ranging in density up to 33,975 per hectare (about 14,000 per acre), in brushy ravines, pastures, grazed upland forest, and ditches. He concluded that the further planting of this species would be biologically unsound. Based upon observation of Autumn Olive and other introduced species in Illinois, Alfred Koelling, Illinois State Museum Curator of Botany, concurs except that he revises the term to "biologically immoral", and Douglas Downing, Supervisor of Land Reclamation for the Illinois Department of

Mines and Minerals, has decided to discourage use of Autumn Olive in mine reclamation based upon documentation of spreading from plantations.

The tendency of Autumn Olive to spread from cultivation is a problem for several reasons:

1. because it is so prolific and matures so quickly, it can multiply at a rapid rate;
2. because it is so site adaptable, it can invade almost any area that is not chemically or mechanically managed;
3. because it is competitive, it is not suppressed by native plants;
4. because it is vigorous, it rapidly converts herbaceous fields and savannahs to shrub thickets;
5. because it is often thorny, it can become physically unmanageable and impenetrable;
6. because it fixes nitrogen, it has the capacity to change soil fertility and affect the nitrogen cycle of natural communities which may depend upon infertile soils;
7. because it is a relatively unknown biological entity, its long term effects upon the various ecosystems it might invade will not be fully understood until the opportunity to control it has long since vanished. The invasion of natural ecosystems in Illinois by exotics such as Autumn Olive differs from other spontaneous regeneration problems because the Department of Conservation is basically the only entity which recognizes it as a problem and takes steps to combat its negative impacts. Natural areas outside of State management control stand to be lost or damaged, with no short term economic incentives for management intervention.

Unlike indigenous species which may spread from cultivation into areas which have been disturbed by human activity, Autumn Olive has not achieved a state of ecological balance in Illinois over thousands of years of interaction with other species. Unlike most other introduced species, Autumn Olive reproduction will not be localized, and shows no signs of natural edaphic or competitive limitation. And unlike Japanese Honeysuckle, Multiflora Rose, Kudzu, and most other alien species which have already proven to be serious economic or biological weeds, Autumn Olive is still being propagated, advocated, distributed, and planted in vast quantities.

MANAGEMENT IMPLICATIONS

Autumn Olive is clearly a subject about which those familiar with its many values and problems find neutrality difficult. An objective review of the information presented in this report indicates the following recommendations for Illinois:

1. Autumn Olive (or any other species) should not be used in monotypic plantings for wildlife;
2. Autumn Olive should not be planted in or near State parks or nature preserves;
3. Autumn Olive should continue to be evaluated for uses such as biomass, if it is harvested prior to fruiting;
4. Autumn Olive should not be considered for further general plantings except,
 - a. where its exotic appearance is not conspicuous or critical,
 - b. where disease and winterkill are not apparent or can be tolerated, and
 - c. where all surrounding land uses within a reproductive barrier zone (of at least one mile?) of the planting are restricted to row crops, urban development, or other intensive management;

5. Autumn Olive should not be promoted for apiary use, hardwood nurse cropping, highway crash barriers, border plantings, or other discretionary uses for which other species can be adequately adapted;
6. Autumn Olive should be monitored statewide for further information on disease problems, winter injury, and reproduction;
7. Autumn Olive should no longer be offered for subsidized public sale by State Nurseries, but should remain available to the general public at competitive cost from those commercial nurseries which have not already discontinued it. Further study may indicate a complete withdrawal from use is necessary;
8. Experiments to determine potential control methods - mechanical, chemical, or biological - should be initiated;
9. Autumn Olive should be substantially replaced in volume in Illinois State Nursery production by a variety of native species, such as those appended to this report; limited quantities could continue to be propagated for specialized uses, but only as specifically approved on a case by case basis by regional staff as well as knowledgeable designated review authorities within the Bureau of Natural Resources and the Bureau of Program Services;
10. Autumn Olive should not be introduced into any Department of Conservation property where it is not already present, and should be eradicated from existing plantations where practical and where alternate species can be established to accomplish the same objective;

Some of the information presented in this report documenting problems associated with Autumn Olive has been unknown until recently. This information, as well as other available data, should be made available to all Department staff involved with use of this species. Officials of the Soil Conservation Service, Shawnee National Forest, State Universities, Illinois Natural History Survey, Illinois

Departments of Transportation and Agriculture, and conservation agencies of various adjacent states should also be made aware of the problems related to use of Autumn Olive in Illinois. Other introduced species presently grown or being considered for use by the Department of Conservation should be subjected to a similar review and to similar restrictions if warranted.

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APPENDIX

RECOMMENDED NATIVE SHRUBS, VINES, AND SMALL TREES
FOR WILDLIFE HABITAT ENHANCEMENT

Guy Sternberg

ALDERS (Alnus rugosa and A. serrulata) -

Fast growing, nitrogen-fixing large shrubs, well adapted to mine spoils and poorly drained sites; seeds, buds, catkins, and leaves provide wildlife food, dense growth provides cover. Should be used in place of Alnus glutinosa, an exotic which can spread from cultivation in Illinois.

SERVICEBERRIES (Amelanchier arborea and A. laevis) -

Small trees or large shrubs with outstanding early white flowers, attractive bark, good fall color, plus wildlife food value (fruits); will tolerate shade along forest borders.

CHOKEBERRIES (Aronia arbutifolia, A. melanocarpa, and A. prunifolia) -

Attractive shrubs with white flowers, good fall color, wildlife food value (persistent fruits); adapted to moist or wet sites, and tolerate some shade along forest borders.

NEW JERSEY TEA (Ceanothus americanus) -

Small flowering shrub with cover value, and useful for browse and seeds as food; adaptable to difficult planting sites.

BITTERSWEET (Celastrus scandens) -

Twining vine with attractive fruit available for wildlife food well into the winter; provides dense cover when planted among supporting shrubs.

REDBUD (Cercis canadensis) -

Small tree with early pink flowers; tolerant of shade along forest borders; reproduces freely once established; seeds persist into winter when other wildlife food is scarce.

FLOWERING DOGWOOD (Cornus florida) -

Small, shade tolerant tree with attractive white flowers and wildlife food value from foliage and persistent fruits.

SHRUB DOGWOODS (Cornus alternifolia, C. amomum, C. drummondii, C. foemina, C. obliqua, C. racemosa, C. rugosa, C. stolonifera) -

Adaptable shrubs, similar to flowering dogwood but not arborescent; some are stoloniferous, expanding vegetatively from original plantings to provide cover; all provide wildlife food value.

HAZELNUT (Corylus americana) -

Stoloniferous shrub with edible nuts and considerable adaptability to various site conditions; dense growth pattern provides cover, and foliage, nuts, catkins, and twigs are a source of food.

HAWTHORNS (Crataegus spp.) -

Small trees and shrubs with attractive flowers and persistent fruit; usually thorny, very site adaptable, provide both food and cover.

PERSIMON (Diospyros virginiana) -

Small tree with fleshy fruit valuable as wildlife food far into winter; very site adaptable.

WITCH HAZEL (Hamamelis virginiana) -

Shade tolerant large shrub with yellow flowers in early winter; very hardy and adaptable, provides seeds and browse.

HOLLIES (Ilex decidua, I. verticillata) -

Large shrubs with persistent fruit, tolerate wet or acid soil; fruiting females have both food and ornamental value.

RED CEDAR (Juniperus virginiana) -

Evergreen tree or large shrub, widespread and hardy, with excellent food value (foliage and fruit) and nesting and roosting cover value; Illinois' only widespread native conifer.

SPICEBUSH (Lindera benzoin) -

Attractive aromatic shrub with early yellow flowers, adapted to understory planting, fruits are a valuable wildlife food source.

CRABAPPLES (Malus angustifolia, M. coronaria, M. ioensis) -

Thicket-forming shrubs or small trees with attractive flowers, adaptable to a variety of open sites; excellent cover species, and all parts of the plant provide wildlife food.

RED MULBERRY (Morus rubra) -

Adaptable to most planting sites, with early summer food value attractive to birds and small mammals.

VIRGINIA CREEPER (Parthenocissus quinquefolia) -

Attractive vine with bright crimson fall color, climbing over supporting shrubs to provide cover; fruits are a valuable food source well into the winter.

PLUMS (Prunus americana, P. angustifolia, P. hortulana) -

Ornamental thicket-forming large shrubs with attractive early white flowers; will spread vegetatively to expand plantings, providing excellent cover; fruits have wildlife food value.

CHOKECHERRY (Prunus virginiana) -

Widespread, ornamental, thicket-forming species, adapted to sun or light shade and a variety of soil conditions; fruits and bark are an excellent wildlife food source, and thickets provide cover.

BUCKTHORNS (Rhamnus caroliniana, R. lanceolata) -

Ornamental shrubs with attractive foliage, tolerant to a variety of site conditions; fruits provide wildlife food.

- SUMACS (Rhus aromatica, R. copallina, R. glabra, R. typhina) -
Small trees or shrubs with attractive persistent fruit and excellent early fall color, tolerant of exposed sites; will spread vegetatively to form thickets, and the fruit and stems provide a nutritious source of winter food.
- GOOSEBERRIES (Ribes cynosbati, R. missouriense) -
Bristly shrubs with edible fruits and a dense growth habit, adaptable as food and cover plants over a broad range of site conditions.
- ROSES (Rosa carolina, R. setigera) -
Colorful shrubs valuable for cover as well as winter food; should not be confused with *Rosa multiflora*, an adventive Japanese species.
- BLACKBERRIES (Rubus allegheniensis, R. flagellaris, R. occidentalis, R. strigosus, etc.) -
Widespread thorny shrubs suited to almost any site in full sun or light shade; spreading vegetatively to form excellent cover patches, and providing summer wildlife food with fruits and foliage.
- SHRUBBY WILLOWS (Salix discolor, S. humilis, S. interior, S. sericea, etc.) -
Thicket-forming dioecious plants suited to wet soil areas and adaptable to vegetative propagation; dense growth provides good cover and excellent browse.
- ELDERBERRY (Sambucus canadensis) -
Widespread thicket-forming shrub with attractive flowers, suited to almost any moist soil; provides cover and excellent summer food.
- SASSAFRAS (Sassafras albidum) -
Small tree with exceptional fall color, an effective soil-builder and extremely adaptable to various soils, browse and fruit provide a valuable source of wildlife food, and clonal thickets provide cover.
- CATBRIERS (Smilax hispida, S. lasioneuron, etc.) -
Bristly vines valuable as escape cover, and a source of winter food.
- BUCKBRUSH (Symphoricarpos occidentalis, S. orbiculatus) -
Low growing shrubs tolerant of dry soil, with foliage and persistent fruit of high food value and dense growth suitable for use as cover.
- BLUEBERRIES (Vaccinium angustifolium, V. arboreum, V. corymbosum, V. vacillans) -
Acid soil plants with spectacular fall color; various species are adapted to wet or dry sites, and all provide cover as well as a significant source of berries and browse.
- VIBURNUMS (Viburnum acerifolium, V. lentago, V. prunifolium, V. rafinesquianum, V. recognitum, V. rufidulum, V. trilobum, etc.) -
Ornamental flowering shrubs with widespread use potential; various species suitable for any planting site, including dense shade, and all species provide fruit for wildlife.
- GRAPES (Vitis aestivalis, V. riparia, V. vulpina) -
Vigorous vines which combine with supporting shrubs to provide dense cover; fruits are available for food over a long season.