

Bane or Blessing?

Method

Students will check out ads that promote the desirable characteristics of autumn olive. Through simple calculations, they will realize how the promise of “abundant fruit” can be a problem if the plant has invasive tendencies.

Introducing the Activity

Autumn olive sounds like a nice plant. The name has a certain ring to it, bringing to mind bright colors and food. Yet this shrub – once promoted as a wildlife food plant, landscape plant, and restoration plant – has a darker side. The exact qualities that made the plant desirable for one purpose are the qualities that help the plant invade areas where it was never intended to go!

Doing the Activity

1. **Bring in a branch from an autumn olive tree.** Ask students to describe the leaves, bark, and fruits. Talk about whether it is an attractive plant or not. Discuss why someone might want it in his or her yard.
2. **Check out the ads.** Pass out copies of the three autumn olive advertisements (pages 65 – top of 66). The first is slightly adapted from an Alabama Forestry Commission flyer. The second is a standard landscape description used by several nurseries on the Internet. The third is combined information from the Plant Invaders of Mid-Atlantic Natural Areas and Invasive.org Web sites. Discuss these questions:
 - Who do you think wrote each description?
 - Who were the descriptions written for?
 - Why are the descriptions so different? Look at the words the writers used to accentuate the plant’s characteristics.
3. **Look closer at abundant fruit production.** Each of the descriptions mentions the production of fruit, but in very different terms. Discuss these questions:
 - How might the abundant fruits produced by autumn olive be a blessing? Who would benefit?
 - How might the abundant fruits be a bane?
4. **Calculate autumn olive’s reproductive potential.** Ask students to complete the problem on the bottom of page 66 by calculating how many autumn olive shrubs and seeds there would be in nine years.



Objectives

- Analyze the ways information is targeted to different audiences.
- Understand how people have introduced invasive plants into natural areas.
- Calculate the reproductive potential of an invasive plant.

Grades

5 – 12

Group Size

Pairs

Activity Time

One 50-minute period

Setting

Classroom in fall

Materials

- Specimen of autumn olive with flowers or fruits, if available
- Copy of advertisements from a forestry commission, an online nursery, and an invasive species organization for each pair (pages 65 – 66)
- Copies of *The Problem with Invasives* for each pair (page 66)

Connections

See next page.

Academic Standards

Grades 5 – 8

- English Language Arts: A.8.4, E.8.3
- Environmental Education: B.8.21, C.8.4
- Math: B.8.7
- Science: F.8.2

Grades 9 – 12

- English Language Arts: A.12.1, A.12.4, D.12.2, E.12.3
- Science: A.12.2, F.12.8

5. **Discuss potential limits to the population.** Ask students if there would really be that many shrubs in nine years. (Fortunately, autumn olive doesn't produce as many seeds in the woods as in landscape situations. And, not all of the seedlings would survive! For example, seedlings might die because of competition with other plants for water, nutrients, and sunlight. Herbivores might eat the leaves, stems, or fruits. People might mow, herbicide, or burn the seedlings. Disease or fungus might affect the plants.) Remind students that not all of these factors affect all plants equally. One of the advantages that invasive plants have over native plants is a lack of predators, diseases, and fungi in their new homes. For example, many birds and mammals eat autumn olive fruits, but the seeds appear to pass through their digestive systems intact and ready to germinate – often far from the parent tree! Recalculate the problem assuming that only 25% of the seedlings survive.

Assessing the Learning

Students should design and write their own landscape tags for autumn olive. They should include information they think is important for homeowners to know when purchasing an invasive plant.

Extending the Learning

Find out how scientists gather information. Instead of using existing information on average seed production, have students calculate it themselves. In late summer or early fall, locate an autumn olive tree laden with fruit. Ask students to remove all the fruit from the tree. Count and weigh the fruits. One source says the average tree produces 30 pounds of fruit. How close to this average was the tree they analyzed? Ask the students how many trees they would need to evaluate before they could confidently state the average fruit-bearing capacity for their area. What would they need to take into consideration? (Size of trees, density of stand, location, habitat, seasonal variations, and competition) Ask each team of students to collect 20 fruits in a cup. Instruct students to squash the fruits and count the number of seeds. Find a class average for the seeds in each fruit. Given the number of fruits on the tree, approximately how many seeds did the tree produce?

Answer to problem!

Year	Mature Plants	Seeds	Immature Plants
1	0	0	1
2	0	0	1
3	0	0	1
4	1	66,000	0
5	1	66,000	59,400
6	1	66,000	118,800
7	1	66,000	178,200
8	59401	3,920,466,000	178,200
9	118801	7,840,866,000	3,528,538,200

Forestry Commission Wildlife Plantings

When native vegetation is insufficient, planting wildlife foods such as autumn olive will provide excellent cover and food. Autumn olive is a deciduous shrub that grows to eighteen feet tall and has numerous stems. The branches spread out about as wide as the shrub is tall. The bark is thin and smooth, changing to gray as the plant ages. The leaves are dark green with silvery undersides. This plant produces an abundance of small yellow flowers each spring and a heavy crop of berries that ripen throughout August and September. The berries range in color from yellow to dark red and are one-eighth to one-fourth inch in diameter.

Adaptation: Prefers deep well-drained or moderately well-drained soils. Competition from adjacent herbaceous weeds and woody shrubs should be eliminated. Autumn olive has low water requirements and a high tolerance to salt and alkali soils.

Uses: Provides soil protection and beautification, and is an excellent food plant for many kinds of birds and mammals. Fruit remains on the plant until late winter, potentially becoming an important wildlife food during periods of seasonal food scarcity. Turkey readily take the red berries in early fall.

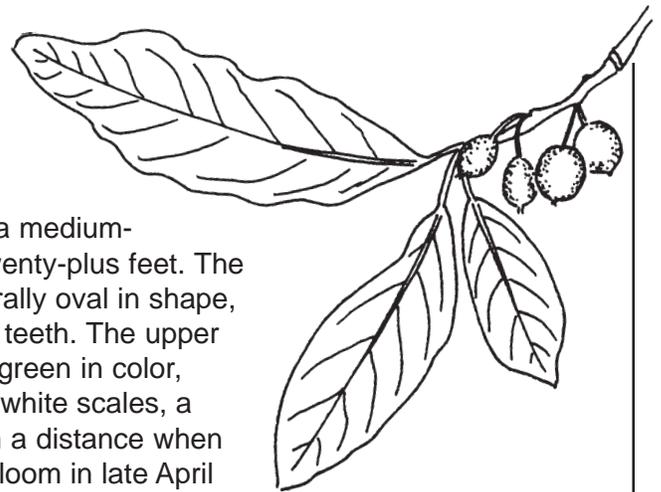
Planting time: From mid-winter to early spring. Not native.

Planting Rate: Space the seedlings eight to ten feet apart for hedgerow planting and at least twelve feet apart for individual plants.

Method of Establishment: Machine or hand plant. The hole must be large enough to accommodate the plant roots without crowding. The hole will have to be four to six inches larger in diameter and four to six inches deeper than the actual plant root measurements.

Shipping: Fall and spring. Shipped bareroot and priced in lots of 25, 50, 100+ seedlings.

Invite Autumn Olive into your yard!



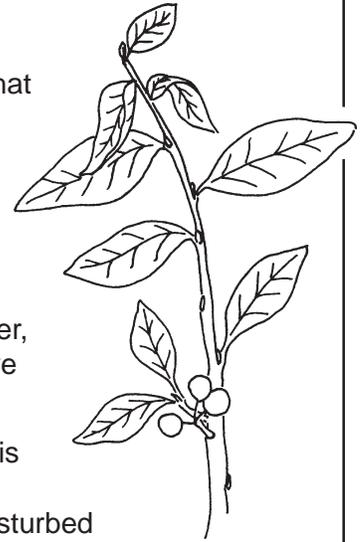
The Autumn Olive tree, *Elaeagnus umbellata*, is a medium-sized tree or a large shrub reaching heights of twenty-plus feet. The leaves, borne alternately on the stems, are generally oval in shape, approximately one to three inches long, and lack teeth. The upper surfaces of the leaves are dark green to grayish-green in color, while the lower surfaces are covered with silvery white scales, a conspicuous characteristic that can be seen from a distance when the leaves move. The small light yellow flowers bloom in late April and May. This deciduous tree is a good plant for fast-growing landscape projects. The small (less than one-fourth inch) fleshy fruits range in color from pink to red, are finely dotted with pale scales, and are produced in abundance each year.

Mature Height 15 – 20 feet
Mature Spread 15 – 20 feet
Mature Form Irregular
Growth Rate Rapid
Sun Exposure Full sun
Soil Moisture Widely adaptable

Soil Type Widely adaptable
Flower Color Yellow
Foliage Color Green
Fall Color Yellow
Zones 3 – 9

Elaeagnus umbellata

Autumn olive is a deciduous shrub from three to twenty feet in height that is easily recognized by the silvery, dotted underside of the leaves. Small, yellowish flowers or red, juicy fruits are abundant and occur on clusters near the stems. Autumn olive is native to China and Japan and was introduced into America in 1830. Since then, it has been widely planted for wildlife habitat, mine reclamation, and shelterbelts. These plantings were often done because the fruits of *Elaeagnus umbellata* are used by many different types of animals as food. However, because the fruit is so desirable to wildlife, birds and other animals have spread the plant throughout a wide range.



Autumn olive is found from Maine to Virginia and west to Wisconsin. It is drought tolerant and thrives in a variety of soil and moisture conditions. This trait allows it to invade grasslands, fields, open woodlands, and disturbed areas. It threatens native ecosystems by outcompeting and displacing native plant species, creating dense shade, and interfering with natural plant succession and nutrient cycling. Because autumn olive is capable of fixing nitrogen in its roots, it can grow on bare mineral substrates.

Do not plant autumn olive. Individual young plants can be hand-pulled, ensuring that roots are removed. If it is burned, it resprouts from the stump. If it is cut, it still resprouts abundantly. Cutting, in combination with herbicide application, is effective. Hedges can be cut down using a brush type mower, chain saw, or similar tool, and stumps treated with a systemic herbicide like glyphosate or triclopyr. Application of these herbicides to foliage is also effective, but is likely to impact non-target species. Herbivorous animals are not known to feed on it, and few insects seem to utilize or bother it. Canker disease is occasionally a problem, but not enough to be useful as a control agent.

The Problem with Invasives

George and Noreen Lapse live next to a beautiful 40-acre wood and enjoy the birds that live there. They are interested in attracting some of the birds into their yard for a closer look. They visit the nursery and purchase a one-year-old autumn olive for their yard. They have heard that the shrub can be invasive, so they vow to watch it carefully. If they see any signs of the shrub spreading into the woods, they will chop it down immediately. Three years later, Noreen gets a job across the state, and the Lapses move. As they drive out of the yard, they sigh as they pass their autumn olive shrub. They are disappointed that it is just now beginning to bear fruit. Someone else will get to enjoy the birds in the yard. When George and Noreen return to visit five years later, will they be surprised?

Calculate how many autumn olive shrubs there will be when the Lapses return and the shrub is 9 years old. Assume all of the seedlings survive. Use a chart to keep track of the number of mature plants, the seeds produced, and the number of immature plants. Use this information to help make your calculations:

- Autumn olive shrubs mature in three to five years. Use an average of four years.
- Mature shrubs produce 40,000 to 120,000 seeds. Use an average of 66,000 seeds per year.
- Seeds can germinate over a wide range of conditions anytime during the growing season. Wisconsin's long, cold winters scarify (scratch) the seed coats and increase germination rates. Up to 90% of the previous season's seeds can germinate in the next year.