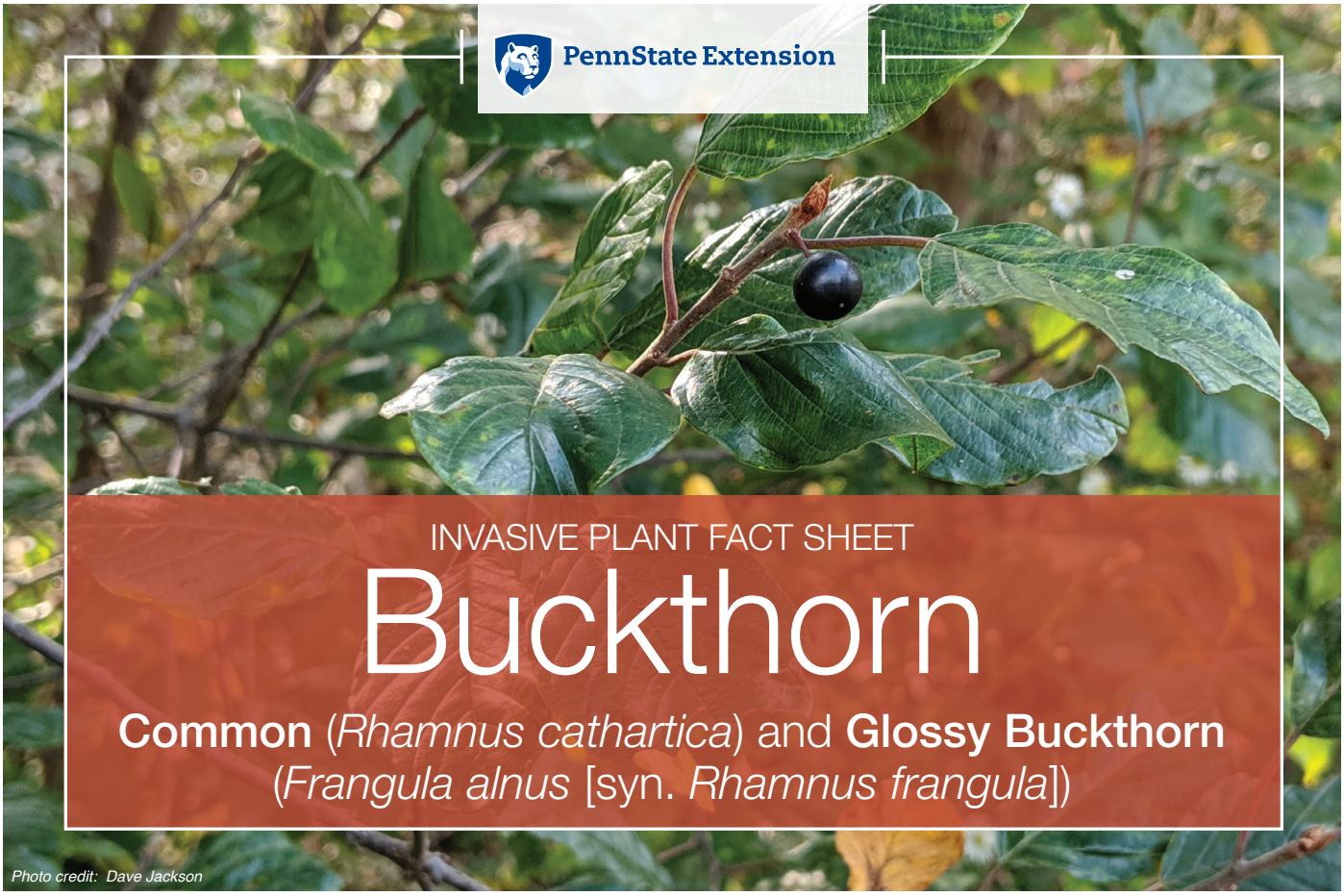

Background

Common (*Rhamnus cathartica*) and glossy buckthorn (*Frangula alnus* syn. *Rhamnus frangula*) are two small trees introduced from Europe and East Asia, respectively. Their showy fruit display and hardy foliage made them popular ornamentals and now highly competitive invaders of eastern woods and wetlands. Both species have naturalized throughout the United States, particularly the lake states and the Northeast. The name of these species originates from the habit of their young branches to break off and form sharp "thorns," though neither species bears true spines or thorns.

Description

Common

Size: Up to 25 feet tall.

Flowers: The flowers are greenish yellow, four petaled, and less than ½ inch across, growing all along the stem. This species is dioecious, or holds only one sex of flower on each plant.

Fruit: Ripening in the fall, the fruit is round, deep purplish black, and about ½ inch in diameter. While only produced on female plants, one individual can be highly productive.

Leaves: Football shaped, suboppositely arranged, finely toothed, and with distinct arcing veins. Each leaf is between 1 and 2 inches.

Stems: Metallic silver-brown bark, creating a gunmetal look. The main bole has many horizontal ridges, called lenticels. The inner bark is vibrant yellow. Twigs are often tipped with a characteristic "thorn."

Glossy

Size: Up to 20 feet tall.

Flowers: The flowers are greenish yellow, four petaled, and less than ½ inch across, growing all along the stem. In contrast with common buckthorn, the flowers of this species carry both pollen and ovaries.

Fruit: Ripens throughout the growing season from green to red to dark purple or black (all stages can be found on the plant at the same time), the fruit is round and about ½ inch in diameter.

Leaves: Football shaped, alternately arranged, and with curved, parallel veins. Tough, leathery, and glossy, unlike common buckthorn they have a smooth, toothless leaf edge, or margin, and tend to be larger at between 1 and 3½ inches.

Stems: Smooth, silver-gray bark. Larger stems show a mottled texture created by the white lenticels, while young growth and buds are covered in fuzzy brown hair.

Common

A. Subopposite leaf arrangement and fruit
B. Bark showing lenticels
C. Buds and "thorn" on young twig
D. Yellow inner bark

Photos by Dave Jackson

Glossy

E. Leaves showing distinctive venation
F. Bark showing white lenticels
G. Fuzzy buds, alternate leaf arrangement
H. Fruit

Photos by Dave Jackson and Scott Weikert

Look-alikes

Native dogwoods have very similar leaves to those of common buckthorn, with their distinct arcing venation. The main difference being that native dogwoods have a strongly opposite branching structure and smooth leaf margins, while common buckthorn has subopposite branching and toothed leaf margins. Smooth alder (*Alnus serrulata*) leaves can also be easily confused with glossy buckthorn, but smooth alder leaves have a rough, toothed margin instead of a smooth one. Also, throughout much of the year, smooth alder holds soft cones, or catkins, which are much different from the juicy berry of glossy buckthorn.

Dispersal

Buckthorns are primarily spread by birds dispersing their abundant and highly visible fruit. The fruit often persists into winter when it becomes even more visible to birds and mammals.

Management Calendar

The management calendar for buckthorn is quite flexible because the foliage emerges early and falls late. Foliar herbicide applications should be applied before the onset of fall color. Stem treatments, to intact or cut stems, provide a year-round window of opportunity.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Leaf Out												
Flowering and Seed Ripening												
Foliar Herbicide Application												
Basal Bark, Cut Stump, and Hack-and-Squirt Herbicide Treatments												

Treatment and Timing

Basal bark and cut stem treatments can be made anytime the weather permits. Product names reflect the current Pennsylvania state herbicide contract; additional brands with the same active ingredients are available.

Treatment	Timing	Herbicide	Product Rate	Comments
Foliar	June to onset of fall color	Aquaneat (glyphosate) plus Garlon 3A or Vastlan (triclopyr)	3 quarts/acre plus 2 quarts/acre or 1.5 quarts/acre	This combination of glyphosate plus triclopyr is effective against a broad spectrum of woody species. Additionally, this mixture reduces risk to nontargets because it has practically no soil activity, and the herbicide products are labeled for use on aquatic plants. Garlon 3A and Vastlan are both water-soluble, aquatic-labeled triclopyr formulations, but they have different concentrations. A surfactant (e.g., Alligare 90) needs to be added. If using a different glyphosate product, be sure to check the product label to see if a surfactant is needed; some come premixed.
Basal Bark	Year-round	Pathfinder II or Garlon 4 Ultra (triclopyr ester)	Ready-to-use or 20%, 1:4 in basal oil	Oil-based herbicides penetrate the plants bark and travel systemically through the plant. Basal bark applications wet the entire circumference of the lower 12 to 18 inches of the stem. Aim for full coverage on stems without creating excessive runoff.
Cut Stump	Year-round	Pathfinder II or Garlon 4 Ultra (triclopyr ester)	Ready-to-use or 20%, 1:4 in basal oil	Cut stump treatments with oil-based triclopyr ester herbicides are applied to the cut surface as well as the bark of the shrub and can be applied up to one month after the stems are cut. An oil-soluble dye should be added to improve tracking, avoid skips, and duplicate treatment.
		Aquaneat (glyphosate) or Garlon 3A or Vastlan (triclopyr)	50%, 1:1 mix with water	Unlike the oil-based Pathfinder II, this water-based treatment should be applied as the stems are cut. A water-soluble colorant is recommended to improve tracking, avoid skips, and duplicate treatments.
Hack and Squirt	Year-round	Aquaneat (glyphosate) or Garlon 3A or Vastlan (triclopyr)	50%, 1:1 mix with water	Hack-and-squirt treatment in the dormant season should girdle the stem. During active growth, the cuts can be spaced, with up to 1 inch between cuts. Apply mixture to cuts with a handheld sprayer. A water-soluble colorant should be added to improve tracking, avoid skips, and duplicate treatment.

Site

Buckthorn's tolerance of deep shade is at the core of its success in invading natural habitats. Though they can also grow in full or partial sun, they thrive in forest interiors where there is less competition from other less tolerant invasive shrubs. Common buckthorn is most often found invading open woodlands and forest edges. Glossy buckthorn trends more toward occupying wet meadows and swamps as well as nutrient-poor sites. Once they fill these gaps with their dense, low canopy, other vegetation is shaded out.

Control

Buckthorns, though prolific seeders, are not difficult to control individually. Small infestations of young plants can be pulled effectively by hand. For larger plants in low-density invasions, a root-wrenching tool or hoe can be used to remove the majority of the root system, which the plant will not recover from. Mowing is an option when removal of the shrub canopy is desired and eliminates the need to drag and chip or burn the stems following cutting. Smaller stems are readily dispensed with heavy-duty rotary or flail cutters (i.e., "brush hogs"). For larger stems, fixed-tooth, drum-type forestry cutters have the capacity to cut stems to the ground line and finely chop the debris.

Mowing is not a stand-alone treatment and is ineffective at controlling plants without follow-up herbicide applications to resprouts. Treating regrowth with a fall (or the next season) foliar or basal bark application is likely easier than stump or stubble treatments following mowing—the targets are easier to find and selectively treating knee-to-waist-high resprouts with a backpack sprayer is a relatively quick process. Another advantage to treating resprouts over cut stubble is that it is easier to distinguish exotic species from native sprouts you wish to release on the site.

Foliar treatments with a backpack sprayer are the most effective means to treat sites with low to moderate plant density. An effective mixture for treating buckthorn is a water-based solution of glyphosate and triclopyr. Be sure to calibrate your spray application to achieve the desired per-acre dosage. This mix provides a broader control spectrum than either ingredient alone, is nonselective, and poses minimal risk to nontargets via root absorption of herbicide. A foliar spray alone is an effective treatment for glossy buckthorn, while common buckthorn is only partially controlled by most herbicide mixtures and will likely require retreatment.

Stem treatments are effective at controlling buckthorn and can be implemented throughout the year, which provides scheduling flexibility. Treatment options include basal bark, cut stump, and hack-and-squirt applications. Basal bark treatments use a concentrated mixture of the herbicide triclopyr ester in basal oil applied to the entire circumference of the lower 12 to 18 inches of the intact stem, treating farther up on larger stems. If the shrubs top growth needs to be removed, the preferred approach is to cut the stems close to the soil line and treat the stump. Apply a 50 percent (1:1) mixture of water with a glyphosate or water-soluble triclopyr product. Or use a 20 percent (1:4) concentration of triclopyr ester in basal oil and treat the cut surface as well as the sides of the stump. Oil-based triclopyr ester can be applied anytime after cutting—as long the stumps can be found—while water-based treatments need to be applied immediately after the stems are cut.

As stems approach 6 inches in basal diameter, it is advisable to switch to hack-and-squirt treatments. Hack and squirt is a highly targeted approach and uses a minimal amount of herbicide. A concentrated herbicide mixture (1:1) is applied to downward-angled cuts in the stem, usually made with a hatchet, below the last live branch. During the dormant season, the cuts should completely girdle the stem, while during the growing season the cuts can be spaced up to 1 inch apart. Using a handheld sprayer, apply the water-based herbicide mixture to fill or saturate the cuts, avoiding excessive runoff.

Both species of buckthorns are persistent and will likely reinvade areas where they have been removed as long as a seed source remains nearby, making constant surveillance a necessity. Removal of reoccurring, isolated individuals is much easier to accomplish as a part of a regular maintenance program. When planning your initial control approach, plan to "save the best," or begin work in the least invaded sites and areas where desirable native vegetation is already present and able to compete. This approach to control work will be more successful over a larger scale, not only producing an outcome of higher ecological value, but also creating a much greater sense of accomplishment.

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