

# Newton Conservators:

Bruce Wenning, Horticulturist, The Country Club, 191 Clyde Street, Brookline, Mass 02467. [bwenning@verizon.net](mailto:bwenning@verizon.net)

**(Lecture outline below).**

## **A. Exotic Invasive Plants Common in Eastern Massachusetts.**

1. Glossy buckthorn (*Frangula alnus* = *Rhamnus frangula*): **Shrub.**
2. Asiatic bittersweet (*Celastrus orbiculatus*): **Vine.**
3. Goutweed (*Aegopodium podagraria*): **Herbaceous ground cover.**
4. Multiflora rose (*Rosa multiflora*): **Shrub.**
5. Garlic mustard (*Alliaria petiolata*): **Herbaceous ground cover.**
6. Bush honeysuckle (*Lonicera* spp.): **Shrub.**
7. Winged euonymus (*Euonymus alatus*): **Shrub.**
8. Japanese barberry (*Berberis thunbergii*): **Shrub.**
9. Tree of Heaven (*Ailanthus altissima*): **Tree.**
10. Norway maple (*Acer platanoides*): **Tree.**
11. Japanese knotweed (*Fallopia japonica*): **Shrub – like perennial.**
12. Porcelain berry (*Ampelopsis brevipedunculata*): **Vine.**
13. Common buckthorn (*Rhamnus carthartica*): **Shrub.**
14. Common barberry (*Berberis vulgaris*): **Shrub.**
15. Japanese yew (*Taxus cuspidate*): **Shrub.**
16. Black swallow – wort (*Vincetoxicum nigrum*): **Vine.**

**B. What Makes a Plant Invasive?** Invasive exotic plants are naturalized, aggressive, non-native plants. Some were intentionally introduced for use in agriculture, horticulture, medicine, forestry, or wildlife enhancement programs. Many were introduced for botanical displays in estate gardens and arboretums. Many people involved with controlling the establishment and spread of exotic invasive plants agree that learning about the invasive traits of each plant (see **E** below) will help with understanding their ecology, especially in the efforts to control them more efficiently.

**C. Why are they bad?** Five site characteristics to consider: space, water, nutrients, shade, plus the ecological damage to native ecosystems.

## **D. Ecological Damage caused by Exotic Invasive Plants**

**1. Native plant succession is affected.** The continuous growth and spread of exotic invasive plants in native landscapes contribute to the interruption and/or overtaking of some native plant species succession. Most exotic invasive plants exhibit rapid growth and prolific seeding which, in time, creates more shaded conditions than if they were not present in the first place. The shade greatly impacts native plant species that are not shade

tolerant. In other words, the increase in the exotic invasive plant population displaces native plant populations that are partial to full shade intolerant. This action eventually alters affected native plant germination, growth, and establishment patterns of the infested (native) area.

For example, I have seen glossy buckthorn stands so dense that the native red oak, *Quercus rubra*, and white pine, *Pinus strobus*, over story was not successful at reproducing on the forest floor below. Too much growing space was taken up and shade created by glossy buckthorn for these partial shade-tolerant native species to germinate and become successfully established. Over time, the area became a red oak, white pine over story with a glossy buckthorn (shrub) understory.

**2. Native seed banks are contaminated.** When left unchecked, the presence of the exotic invasive plant or plants prove to be a continuous, long-term source of seeds for further invasion of new areas and re-invasion of the invaded area (e.g. the germinating seed of glossy buckthorns take up more space and create more shade which inhibits some light-loving native plants from successfully germinating and becoming established).

**3. Ecosystem processes may be altered.** These pestiferous plants alter many ecosystem processes including but not limited to plant-soil fertility cycles; decomposition rates of litter layers; soil erosion rates; and water table levels, all of which affect soil food web interactions and populations. Additionally, some exotic invasive plants may hybridize with closely related native species.

**4. Animal population food sources are affected.** Native and non-native animal populations may shift in distribution patterns and population size by favoring exotic invasive plant species as an alternative food source to native plant (food) sources. This especially occurs when species such as glossy buckthorn, common buckthorn and Asiatic bittersweet vine reaches high population levels.

## ***E. Quick Review of the Ecological Traits of Invasive Plants***

**1. High seed production and good seed viability.** Asiatic bittersweet vine produces a huge amount of seed annually. Only two-thirds of them will sprout, but the sheer number of seeds produced ensures that bittersweet spreads rapidly.

Glossy and common buckthorn, produce large amounts of annual seed too.

**2. Seed is easily dispersed by wind, animals, or water.** The seeds of glossy buckthorn, honey suckle, and autumn olive, *Elaeagnus umbellata*; are primarily dispersed by **birds** over great distances. The small seeds of common reed, *Phragmites australis*, are effectively carried by **wind**. The aquatic invasive purple loosestrife, *Lythrum salicaria*, is spread by **water** currents.

**3. Seed viability and sexual reproduction.** Some invasive plants reproduce sexually; the plant requires pollen to fertilize the flower.

Sexual reproduction can either require separate male and female plants (termed dioecious reproduction) or involve male and female reproductive structures on the same plant (monoecious). Monoecious plants produce flowers, fruit, and seed on the same plant.

Since only a single monoecious plant is needed to start a population, invasives of this type can rapidly colonize and spread into new areas. Most invasive plants are monoecious, which is why they are so threatening to our native ecosystems. Once seeds are produced, more than half will germinate under ideal conditions. However, not all seeds germinate as soon as they contact bare soil. Delayed germination may occur. Seeds displaying this trait become part of the **seed bank**, the collection of dormant seeds in the soil of the infested site and can linger until environmental conditions are right for germination at a later point in time. Researchers have found that some exotic invasive species such as purple loosestrife and garlic mustard demonstrate **high seed viability**: they can persist in soil for many years before germinating.

Be aware at what point in its life cycle an invasive plant produces flowers, fruit, and seed. According to restoration ecologist, Josh Ellsworth (Ellsworth Land Management, Somerville, Mass), “You should always think about seeds when undertaking any invasive plant control project.”

**4. Vegetative reproduction.** Some exotic invasive plants, such as glossy buckthorn, can sprout from cut stumps or stems pushed to the ground by fallen branches. Others can sprout from roots (rhizomes), like Japanese knotweed, black swallow-wort, and Asiatic bittersweet vine.

**5. Predator avoidance and / or deterrence.** Some exotic invasive plants have physical structures (spines, prickles, etc.) that deter grazing animals and humans from touching them. Japanese barberry is a good example. Other plants produce chemical compounds unpalatable to plant feeding animals (e.g., Japanese stiltgrass, *Microstegium vimineum*).

**6. Timing of leaf out and leaf loss.** Some exotic invasive plants gain an edge over our native plants by leafing out earlier in the spring or holding onto their leaves longer in the fall. These traits enable the photosynthesis period to be slightly longer than those of native species, allowing the invasive plants to store more carbohydrates (energy) in their roots. Glossy buckthorn, honeysuckles, garlic mustard, and Japanese barberry exhibit this trait.

**7. Shade / light tolerance.** Seedlings with shade tolerant traits—such as glossy buckthorn, garlic mustard, and Asiatic bittersweet vine—can germinate and become established in shady areas. Don't be fooled; shade tolerant species can grow rapidly when the shade opens up due to tree branch dieback, breakage, or fallen trees. However, some exotic invasive plants are shade intolerant and can grow better in sunny areas (e.g., Tree-of-Heaven).

**8. Time of year of fruiting duration.** Different invasive plants set fruit at different times of the year, not just in the fall. Many exotic invasive woody plants produce fruits and seeds longer than native plants. Observe when invasive plants set their fruit, so that you can control them before they set fruit (seed). According to Ellsworth, this will give the maximum control for the least amount of effort.

In order to control your invasive exotic plants, identify your invasives correctly and review these traits.

**9. Broad range of soil and site conditions.** Most terrestrial exotic invasive plants tolerate broad soil and site conditions for germination, growth and development.

**F. Control Methods.** You can start controlling invasive plants by reviewing the above list of invasives and look up the best control methods for that plant on the web sites at the end of this article. I like: [www.invasive.org](http://www.invasive.org)

**The three most common control methods are (1) hand – pulling (2) mowing or repeated cutting, and (3) herbicide applications (stump application for woody plants or foliar application for both woody and herbaceous species).**

You will discover that the best time for any control option is before a plant flowers. **Ask me why.**

In addition, the application of herbicides in July, August, and up to mid-September gives the maximum chemical control. These are the months that carbohydrates and other compounds are being transported from the leaves to the roots for storage. This downward flow of plant compounds helps facilitate the transport of herbicide when applied at this time. Cutting or mowing of exotic invasive species is very effective during these months for the same reason. When you cut the top off any plant, the roots push up more top growth, depleting the root reserves of carbohydrates and other growth compounds. Every time you cut, you deplete these reserves and weaken the plant. To deplete the root reserves even faster, cut before June on a monthly basis. With repeated cutting over many years, you can deplete the roots of their energy and kill the plant.

**Winter cut-stump application of herbicide;** November through February is ideal for using herbicide on freshly cut stumps.

## Resources

### Websites:

1. Invasive Plant Atlas of New England: <http://www.invasives.eeb.uconn.edu/ipane>
2. Invasive and Exotic Species of North America: <http://www.invasive.org>
3. TNC Wildland Weeds: <http://www.tncweeds.ucdavis.edu/esadocs.html>

4. Government: [www.plants.usda.gov](http://www.plants.usda.gov)
5. Invasive Plants Association of Wisconsin: <http://www.ipaw.org>
6. **Ecological Landscape Alliance:** <http://www.ecolandscaping.org>

[Click on Invasive plants.](#) **or** [www.ecolandscaping.org/ipm](http://www.ecolandscaping.org/ipm)

**Books about Invasive Plants: Numbers 1 and 2 should be bought together.**

1. John M. Randall & Janet Marinelli, Editors **Invasive Plants: Weeds of the Global Garden.** Brooklyn Botanic Garden. Handbook # 149, Winter 1996. [www.bbg.org](http://www.bbg.org)
2. C.Colston Burrell; Janet Marinelli and Bonnie Harper – Lore, (editors). **Native Alternatives to Invasive Plants.** 2006. Brooklyn Botanic Garden Handbook # 185. Brooklyn, N.Y. [www.bbg.org/nativealternatives](http://www.bbg.org/nativealternatives)
3. Devine, R.S. 1998. Alien Invasion. America's Battle with Non-Native Animals and Plants. National Geographic Society.
4. McNight, Bill, N. (Editor). 1993. Biological Pollution. The Control and Impact of Invasive Exotic Species. Indiana Academy of Science. Indianapolis.

**Books to help you with Tree and Shrub Identification:**

1. The Shrub Identification Book by George W. D. Symonds. William Morrow Company, New York.
  2. The Tree Identification Book by George W. D. Symonds. William Morrow Company, New York.
- Note:** both books by Symonds are old standard college texts that have **excellent photos.**

**Acknowledgement:** Special thanks to Josh Ellsworth (formerly of Ellsworth Land Management, Somerville, Mass, and currently instructor at Brandies University) for the 'invasive traits' information in this lecture outline he gave me many years ago.

*Revised 5/21/2016; 4/2/2018 Bruce Wenning*