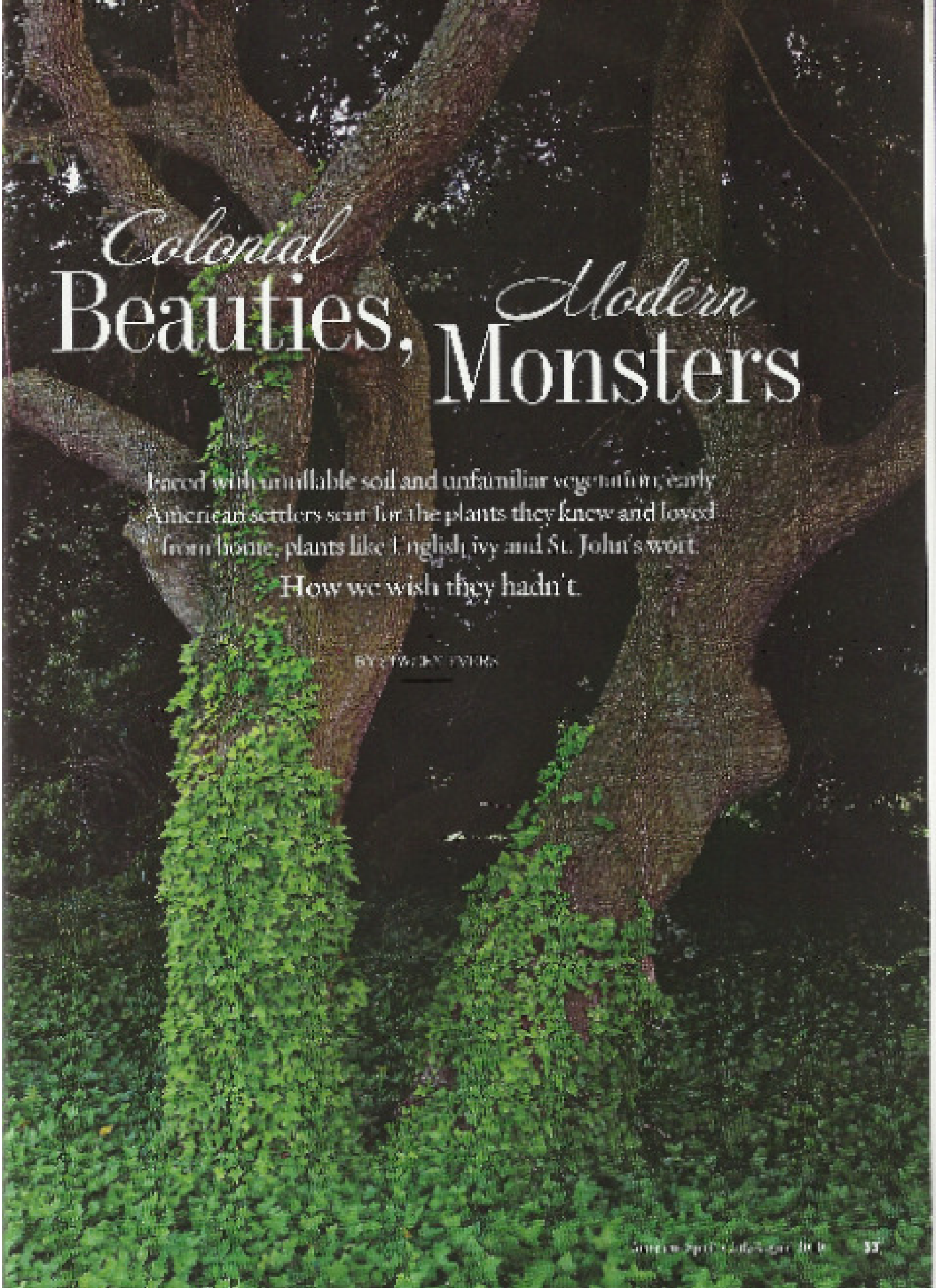

Colonial Beauties, *Modern* Monsters

Faced with unfamiliar soil and vegetation, early American settlers sent for the plants they knew and loved from home, plants like English ivy and St. John's wort. How we wish they hadn't.

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Left: English ivy climbing a pine tree. Above: Chinese wisteria. Inset: Wisteria vines wrapping around a pine tree

For most of us, vegetation comes in two varieties: plants we love and weeds. But some weeds are more insidious than others. They grow aggressively, expanding their range at the expense of other plants and disrupting complex networks of ecological relationships. These über-weeds generally hail from far-flung places and do not face local predators. They flourish with abandon. Appropriately, they have been labeled "invasives."

The U.S. Department of Agriculture (USDA) estimates that invasives cost the United States about $33 billion a year in lost crop production. Farm fields aren't the only danger zones; invasives are ubiquitous and fairly undiscriminating. Nearly half of all the United States' endangered and threatened plants are jeopardized by invasives, according to the 2004 findings of Cornell University ecologists. You're likely to run across invasives during a walk in your local park or your own neighborhood. The names of familiar and sometimes beloved plants populate an ever-growing list of offenders: Norway maple, Chinese and Japanese wisteria, periwinkle, burning bush, honeysuckle, and callery and Bradford pear, just to name a few.

What brought these species to the United States? Human beings, mostly. Many invasives were intentionally introduced for crops, gardens, pharmaceutical purposes and forage for the livestock that also were imported. But some slipped in as stowaways, clinging to boots and sheep's wool, contaminating imported grains or waiting in the dirt and sand thrown onto Colonial-era sailing ships as ballast. Once in the Colonies, the wet ballast was tossed ashore. Any seeds therein "were watered and ready to go," says Wallace Kaufman, an Oregon-based naturalist and co-author of the comprehensive field guide *Invasive Plants* (Stackpole Books, 2007).

The No-Ivy League

English ivy offers an example of good intentions gone bad. The earliest record of the low-maintenance, decorative plant in North America dates to 1727. While its sinuous vines graced the buildings of Colonial towns and universities, it also quickly traversed the continent. Today it thrives in 26 states and lower Canada. But in 18 of these states and the District of Columbia, it is reportedly invasive, weighing down and strangling trees, smothering native competitors for light and space, and prying apart wooden siding on buildings. Its success is largely due to two

English ivy has been so disruptive to the ecology of the Pacific Northwest that in February of this year, Oregon became the first state to ban the sale, transport or propagation of English ivy.

CLOCKWISE FROM LEFT: THE OHIO STATE UNIVERSITY; DAVID CAPPAERT, MICHIGAN STATE UNIVERSITY; SAM CLARK, USDA NATIONAL PARK SERVICE; LINDA HAUGEN, USDA FOREST SERVICE; BUGWOOD.ORG

Among the Worst Offenders:

Who they are and how they got here

Species: — **Why it is a threat:**

Black henbane — One of the first plants to be introduced to the Colonies, it contains two highly toxic alkaloids that have been used as sedatives. These alkaloids can increase the intoxicating effects of beer (although too much black henbane would be lethal). The plant is prolific: Each one produces hundreds of thousands of seeds, and the majority of the resulting plants survive because they are poisonous to most mammals.

Canada thistle

Likely arrived unintentionally in the early 1600s as a contaminant in agricultural seeds. Crowds out native vegetation to reduce diversity, disrupts crop yields, and hosts multiple insects that damage crops.

Chinese tallow tree — Benjamin Franklin imported it for soap and candle making in 1776. In Florida, where it has created dense monocultures, the tree is called "terrible tallow." A single tree may produce tens of thousands of seeds that can survive for years, and its tannins alter soil chemistry by adding nitrogen and phosphorus. The leaves, fruit and sap are toxic to humans.

Common privet — Likely introduced in the 1700s as a garden plant, its dense growth denies native plants light, water and space.

Garlic mustard

Believed to have been introduced in the early 1800s for salads and soups. Displaces spring wildflowers and may inhibit the growth of fungi that native plants rely on to obtain soil nutrients. Also threatens butterfly species because it resembles the native mustard plants that the butterflies lay their eggs on; larvae can't survive because of the garlic mustard leaf's different chemistry. Its seeds can remain dormant in the ground for up to five years.

Norway maple — John Bartram, America's first native-born botanist, introduced it into his renowned Philadelphia garden in 1776. The tree's deep shade and dense root system challenge other plants' ability to establish.

Purple loosestrife

One of the first introductions to the Colonies, it is believed to have been transported in ship ballast, livestock bedding and/or livestock feed. Also imported for gardens. Highly tolerant of varying water and soil conditions, and damaged stems or roots produce new shoots and buds. A single plant can produce more than 1 million seeds per season. In some areas, it has displaced half the native plant population, endangering a host of plants and animals, but it also can be an important source of food for honeybees.

Sapodilla

This fruit may have been introduced to Florida as early as the 16th century. Popular in Central America, where sapodilla is native. Creates a dense shade too dark for other plants to survive in.

St. John's wort — Introduced into Philadelphia in 1696 by German immigrants who believed it could exorcise the devil. Dense colonies outcompete natives, and a single plant can produce up to 30,000 seeds. This species of St. John's wort (*Hypericum perforatum*), which is still used to treat mild depression, is different from other, native *Hypericum* species that share the name St. John's wort.

Tree of heaven — A gardener introduced this Chinese native to Philadelphia in 1748. The tree has an aggressive root system that releases chemicals that prevent other plants' growth.

Woolly mullein — Introduced into Virginia in the mid-1700s, likely as a traditional remedy for coughs, diarrhea and other illnesses. In Michigan by the 1830s and on the West Coast by 1876. Thrives in disturbed soils before other plants can establish, and its seeds may remain viable for at least 100 years.

characteristics: It invades as both a climbing vine and dense ground cover, and it is an evergreen, continuing to grow after native competitors have succumbed to low temperatures.

"English ivy eliminates other ground covers entirely," Kaufman says. "It eliminates an awful lot of the natural system."

English ivy has been so disruptive to the ecology of the Pacific Northwest that in February of this year, Oregon became the first state to ban the sale, transport or propagation of English ivy. (The ban also applied to butterfly bush, which didn't cross the Pacific from southwestern China until about 1900.) The prohibition, which also applies to potted plants and floral arrangements, took effect June 1 in order to give nurseries time to sell the stock they had on hand.

Even on the East Coast, where English ivy has enjoyed a long history of cultivation in gardens and yards, the vine now poses a threat. It is deemed one of the "worst weeds"

at Monticello, ranking 14th on a list compiled for *American Spirit* by Peter Hatch, gardens and grounds director (see table, page 37). He and his staff have made "concerted efforts" in recent years to combat invasive species, but, he says, "the battle has only begun." The Thomas Jefferson Foundation is studying the sustainability of the property, and Hatch says he suspects that hiring an invasive plant manager will be one of the final report's recommendations.

Useful Blossoms Turn Useless

There's a touch of irony to the plague of invasives at Monticello, given Thomas Jefferson's strong advocacy for the importation of plant species. "The greatest service which can be rendered to any country," Jefferson famously said, "is to add a useful plant to its culture."

But our third president can hardly be blamed for contemporary flora troubles. Not only was Jefferson referring to economically useful plants like rice and bread grains—a philosophy reflected in the 170 varieties of fruit and 330 varieties of vegetables planted in his gardens—but he "lacked 200 years of hindsight to be able to judge whether certain introduced species might become the pests, the bullies, the weeds of the garden world," Hatch writes in "Garden Weeds in the Age of Jefferson" (*Twinleaf Journal*, 2006).

Also, Jefferson's early 19th-century proclamation came late in the New World's history of plant introduction. Three hundred years before, Spanish settlers had introduced plants like Central American native sapodilla, or chicle-gum tree, into Florida, where today its dense stands cast shade too dark for most native plants to survive. The British also were quick to bring in exotics, pushing Colonial farmers to grow non-native crops like sugarcane that would allow England to be less dependent on foreign sources.

From top: Star of Bethlehem, black henbane and wild onion

In 1629, the fields around Jamestown were home to "all manner of herbs and roots we have in England," John Smith observed. When English tourist John Josselyn visited his brother in "Mayne" in 1638 and 1663, he noted in his accounts that New England's rocky landscape featured dandelion and chickweed. Within a century, some of the introduced plants were already being singled out as aggressive troublemakers. John Bartram, the first American-born botanist, in a 1759 letter described and decried 35 "troublesome" plants, including "stinking" butter and eggs (also called toadflax) and "pernicious" St. John's wort.

Of the 20 worst weeds at Monticello today, five were known to be serious threats in the United States before 1832: chickweed, various species of briars, wild onion, Bermuda grass and crabgrass. It's hard to believe that crabgrass once was purposefully planted and cultivated, but to our forefathers, it was good feed for livestock. "I think even Jefferson regarded crabgrass as a legitimate forage for pastures," Hatch says. "It grows in lawns when everything else is dormant during the late summer heat and drought."

Fighting Foul Flora

For nearly 150 years, the United States government distributed exotic seed and plants to farmers and introduced experimental plants from abroad. Then, in 1912, Congress passed the Plant Quarantine Act to quell widespread worries about pest problems in U.S. nursery stock. At the time, the United States was the only major nation lacking legislative safeguards against importing infested plants, according to a USDA history.

MARY ELLEN (MELLIE) HARTE, THE OHIO STATE UNIVERSITY, BUGWOOD.ORG

The 1912 law allowed the USDA to declare quarantines and establish programs regulating plants. Following its passage were a series of plant-related regulatory programs, building to a 1999 presidential executive order forbidding federal programs from introducing invasive species and providing for the restoration of native species in invaded ecosystems. The order also calls for biennial management plans for the nation's invasive species, whether they are plants, animals or pathogens.

Critical to the eventual success of these plans is a USDA lab that until earlier this year was called the Invasive Weed Management Unit. Now merged with another lab and renamed the Global Change and Photosynthesis Unit, it is one of the few federal facilities devoted to solving weed issues.

While much of the USDA's weed-management efforts are focused on field crops like wheat, corn and soybeans, this research unit works on vegetables, organic products and biofuels. Adam Davis, one of the lab's research ecologists, has dedicated himself to screening potential biofuel plants to make sure they don't become invasive.

"We want to make sure that we do due diligence before we roll these things out on millions of acres," Davis say. "The USDA has gotten black eyes on occasion from releases gone awry."

The campaign against invasives isn't one that anyone expects to win via total eradication. Weeds are too diverse and too adaptable and, on occasion, fill important gaps in an unstable ecosystem. For instance, English ivy kills native competitors but provides shelter for small birds; purple loosestrife is rampant across the continental United States, significantly displacing several animal and plant species, but in some areas is an important source of nectar for honeybees.

"This is an endless work," says naturalist Kaufman. "In many ways, we are reduced to the role of a referee."

Stacey Evers wrote about the Colonial baby boom for the September/October 2009 issue.

20 Worst Weeds in the United States Before 1832

(Lines in color denote plant species on both lists.)

1.	Wild onion (*Allium vineale*)	intro
2.	Bermuda grass (*Cynodon dactylon*)	intro
3.	Canada thistle (*Cirsium arvense*)	native
4.	Burdock (*Arctium minus*)	intro
5.	Dandelion (*Taraxacum officinale*)	intro
6.	Narrow-leaf plantain (*Plantago minor*)	intro
7.	Briars (*Rubus sp.*)	native
8.	Crabgrass (*Digitaria sp.*)	intro
9.	Horse nettle (*Solanum carolinense*)	native
10.	Elderberry (*Sambucus canadense*)	native
11.	Jimson weed (*Datura stramonium*)	intro
12.	Poke salad (*Phytolacca americana*)	native
13.	Foxtail (*Setaria glauca*)	intro
14.	Broom sedge (*Andropogon virginicus*)	native
15.	Lamb's quarter (*Chenopodium album*)	native
16.	Plantain (*Plantago major*)	intro
17.	Mullein (*Verbascum thapsis*)	intro
18.	Star of Bethlehem (*Ornithogallum sp.*)	intro
19.	Chickweed (*Cerastium vulgatum*)	intro
20.	Queen Anne's lace (*Daucus carota*)	intro

20 Worst Weeds at Monticello Today (2010)

1.	Japanese stilt grass (*Microstegium vimineum*)	intro *
2.	Russian olive (*Eleagnus sp.*)	intro * & ***
3.	Akebia vine (*Akebia bipinnata*)	intro *
4.	Bittersweet (*Celastrus scandens*)	intro *
5.	Winged stem (*Verbesina alternifolia*)	native ***
6.	Johnson grass (*Sorghum halpense*)	intro ** & ***
7.	Japanese honeysuckle (*Lonicera japonica*)	intro *
8.	Nutsedge (*Cyprus esculentus*)	native **
9.	Ailanthus (*Ailanthus altissima*)	intro *
10.	Silver goosegrass (*Eleusine indica*)	intro *
11.	Crabgrass (*Digitaria sp.*)	intro **
12.	Wineberry (*Rubus occidentalis*)	intro *
13.	Bindweed (*Convolvulus arvensis*)	intro **
14.	English ivy (*Hedera helix*)	intro *
15.	Poison ivy (*Rhus radicans*)	native * & ***
16.	Wild onion (*Allium vineale*)	intro **
17.	Chrysanthemum weed (*Artemesia vulgaris*)	intro **
18.	Chickweed (*Cerastium vulgatum*)	intro **
19.	Bermuda grass (*Cynodon dactylon*)	intro **
20.	Princess tree (*Paulownia tomentosa*)	intro *

* Native forest invasive
** Garden invasive
*** Pasture invasive

While invasives most often are non-natives, native plants also can grow aggressively, as seen on these lists.

Source for pre-1832 list: "Ecological Imperialism? Southern Garden Pests and Pesticides, 1700-1830" by Peter Hatch, director of gardens and grounds at Monticello. Proceedings of the 13th Conference on Restoring Southern Gardens, Winston-Salem, N.C., September 2001.

Source for 2010 list: Peter Hatch, director of gardens and grounds at Monticello