The Invasive Problem , Understanding the Issue - Part One

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by C. Colston Burrell

Our quest for plants from around the globe has enriched our gardens and brought us important food plants. At the same time, we have unwittingly created some devastating ecological consequences. Imported plants have spread pests and disease, including Dutch elm disease and dogwood anthracnose. Ornamentals, such as amur honeysuckle (*Lonicera maackii*) and oriental bittersweet (*Celastrus orbiculatus*), threaten native ecosystems. Many have negative effects on animals as well. The Nature Conservancy believes that invasive species contribute to the decline of 49 percent of all threatened and endangered species. This percentage is second only to habitat destruction.

An invasive species—be it plant, animal, or pathogen—is defined by Executive Order 13112 (1999) as a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. While the majority of ornamental plants are not invasive, from time to time a plant adapts too well, escapes cultivation, and becomes established, or naturalized, in the native landscape. The Plant Conservation Alliance has identified approximately 500 species of exotic plants across the country that are competing with native species and altering the structure and function of the ecosystems they invade. Of these 500, the New England Wild Flower Society estimates that horticultural activity is responsible for about 60 percent of invasive species introductions, while conservation activities, such as erosion control, windbreak, and wildlife enhancement introduced about 30 percent. Accidental introductions make up the remaining 10 percent.

Despite these statistics, exotic-plant bashing has become the pastime of zealots who would like to ban all nonnative plants. This is neither necessary nor desirable. Not every naturalized plant poses a threat to native ecosystems. Not every invasive species acts the same in all regions of the country, or in all ecosystems within a region. Buckthorn (*Rhamnus cathartica*) is a good example of a soil-specific species. This hedging shrub, popular in the Midwest and parts of the East, becomes a major problem on neutral to alkaline glacial soils. It is not a problem in most of Virginia, where acidic soils prevail, but on the limestone bedrock of the Shenandoah Valley, it runs rampant. Other plants are problematic only in ecosystems at specific stages. Tree of heaven (*Ailanthus altissima*) and princess tree (*Paulownia tomentosa*) thrive on disturbed sites; linden viburnum (*Viburnum dilatatum*) thrives in mature forests. Privet (*Ligustrum* spp.) is specific to riparian systems.

How Problems Start

When a plant escapes cultivation and begins to proliferate, problems arise. Two plants cannot occupy the same spot. When an invasive plant finds a favorable habitat, it can crowd out native species by growing faster or taller, leafing out first, or holding its foliage longer. Once entrenched, exotic species dramatically transform the vertical and horizontal structure of the ecosystem, potentially altering hydrology and corrupting nutrient cycles.

For a plant to escape cultivation, many favorable events must happen in tandem. First, the seed must be dispersed beyond the confines of cultivation, most often by animals, wind, or water. Berries eaten by migrating birds can move many miles. Seeds attached to animal fur travel great distances before dislodging. Wind-dispersed plants usually show up in a pattern on the leeward side of the parent plant, though gusts can carry seeds many miles.

The seed must survive predation and germinate, and the plant must reach reproductive maturity, which may take a season in an annual like Japanese stilt grass (*Microstegium vimineum*) or more than a decade with some woody plants, such as viburnums.

A seed has a slim chance of falling on a favorable substrate in a favorable niche and surviving to maturity. But if it does, the problem balloons. Each season, dozens (or hundreds or thousands) of seeds fall, as opposed to the random event that introduced the original seed. Free from natural checks and balances, the exotic plant may reproduce exponentially.

Invasive plants can hold staggering economic consequences. Ellen M. Jacquart, director of stewardship with the Indiana chapter of The Nature Conservancy, estimates the total cost of dealing with invasive plants to be $35 billion per year. Many of the well-documented invasives are so thoroughly entrenched that it may be impossible to totally eradicate them. This fact should not be seen as justification for ignoring the problem or for continuing to buy the offending plants. Instead, it points to the importance of early detection of emerging invasives, and the need to eliminate these plants from the palette that we have traditionally relied upon.

First Steps

The time has come for us to take steps to ensure that our gardens do not contribute to the problem. Do not count on your local nursery or a horticultural consultant to do this for you. While many conscientious nurseries voluntarily remove known invasives from their stock, others remain interested in simply selling plants. Because plants are regionally and ecosystem specific, it may be difficult to predict the next invader, but a few traits should put up red flags. Nonnative species bearing fleshy fruits head the suspect list. Proven culprits include autumn olive (*Elaeagnus umbellata*), burning bush (*Euonymus alatus*), and Japanese barberry (*Berberis thunbergii*). One commitment we can all make is to exclude nonnative plants with fleshy fruits from our gardens. This is a simple way to start protecting the future of our wild lands, which sits in our hands.

The Invasive Problem, Choosing Alternatives - Part 2

Our personal choices sometimes have consequences beyond the confines of our private gardens. While most ornamental plants, such as catmint, iris, and hydrangea, are noninvasive, some species jump from gardens to natural areas and do too well there, causing long-term ecological consequences. Invasive species alter the structure and function of ecosystems and displace native plants. When we design a landscape, aesthetics often rule our choices, but it is equally important to consider each plant's potential to invade.

Sarah Reichard, exotic-species expert at the University of Washington, estimates that only four percent of ornamental plants are invasive—a fraction of the garden plants introduced to North America since European settlement. (*Invasive* and *aggressive* are not interchangeable concepts. Aggressive plants are garden thugs that spread rapidly in enriched garden beds, but do not necessarily escape the confines of the garden.) That said, it seems that nearly 65 percent of invasive plants nationwide were introduced for ornament. In short, while the total number of invasive ornamental plants is low, most invasive species were intentionally introduced to this continent.

Choosing substitutes for invasive plants is simple. First, consider what makes any plant "ornamental." Why do we choose linden viburnum over maple-leaf viburnum? *Albizia* over *Amelanchier*, or vice versa? Most people are drawn to flowers, often a plant's most conspicuous and colorful attribute. Foliage is enduring and compelling, the most consistent character during the growing season. Berries and dried seedpods appeal as autumn and winter interest, and bark, whether rough and furrowed or smooth and glossy, figures prominently when we choose trees and shrubs. Woody plants lend shape and pattern through their architecture. Plants also fulfill roles outside of aesthetics in our private and public landscapes. They mark boundaries and define garden spaces. They serve as safety barriers and windbreaks, control erosion, build soil, and help repair damage caused by environmental degradation. Beauty and utility, in varying degrees, influence all our decisions.

Choosing Alternatives

If your garden design includes an invasive plant, you can find a pleasing alternative. Determine the main feature for which the plant was chosen in the first place, and look for an alternative with a similar trait. Whether you're looking at flower color, season of bloom, overall shape and size, or foliage color and texture, it is often easy to find a suitable substitute—one that falls in line with more than one of these details. While it is not always possible to match every attribute, the compromise is usually minimal. Consider care, as well. Many invasive plants came to be widely used because they are tough and serviceable. If a proposed alternative needs coddling to succeed, it is unrealistic to think it will serve as a viable substitute.

When looking for alternatives to invasive exotics, the plants native to this continent are a logical place to start. However, just as not every invasive plant is truly invasive in all parts of the country, or in all ecosystems within a region, not all native plants are suitable for all areas. Locally native plants make especially good alternatives because they are often as easy and dependable as their invasive counterparts, being naturally adapted to the local climate and conditions. Native plants from outside of your location can work; just be sure to think about the plant's native range and the specific site conditions of its natural habitat. It is not enough to say a plant is native to Virginia. Look at the actual place in which it is found, be it forest, field, or wetland, as well as its favored or tolerated exposure and its requirements for soil texture, pH, and moisture content. If these match the specifics of your garden, the plant will likely thrive.

Here is an example of how I choose a suite of substitutes. Purple loosestrife (*Lythrum virgatum/salicaria*) is a popular ornamental that is widely invasive. It bears rosy pink to purple flowers in summer, in spikes three to five feet tall. As substitutions, I chose six widely different species that give the overall look of loosestrife. All are native to moist, open areas. The closest match is fireweed (*Chamerion (Epilobium) angustifolium*). Its rose pink flowers are larger and showier than those of purple loosestrife, and they are borne in terminal spikes three to five feet tall. Fireweed blooms for a shorter period of time, but overall it is an excellent substitution. Prairie blazing star (*Liatris pycnostachya*) is another good choice, with pink-purple summer flower spikes three to five feet tall. Plants with similar flower color but different flower form include swamp milkweed (*Asclepias incarnata*), sweet Joe-Pye weed (*Eupatorium purpureum*), and queen-of-the-rairie (*Filipendula rubra*). Anise hyssop (*Agastache foeniculum*) has the form of loosestrife, but its spiky four-foot inflorescences are blue to purple, rather than pinkish. The final decision depends on whether flower color or flower form is most important to the design.

Safe and satisfying alternatives exist for all the invasive plants commonly grown as ornamentals, but the responsibility for making these choices in your garden rests on your shoulders. Seeing the multiple attributes of landscape plants makes finding other options easier. Train your eye to notice and value the plants around you for all their traits, and you'll come to make logical substitutions.

Opting out of invasive ornamentals

1. Plants with showy flowers

A number of invasive species, particularly herbaceous plants, contribute colorful flowers, and to a lesser extent, interesting foliage or decorative seed heads to the designed landscape.

Invasive Plant - Native Alternatives
Wisteria floribunda - Wisteria frutescens, W. macrostachys
Hesperis matronalis - Phlox carolina, P. paniculata
Iris pseudacorus - Iris virginica, I. fulva
Miscanthus sinensis - Panicum virgatum, Sorghastrum nutans
Ranunculus ficaria - Caltha palustris, Chrysogonum virginianum, Senecio aureus, Zizia aptera

2. Plants with decorative or colorful foliage

Both woody and herbaceous plants are used for foliar effect in the landscape. Foliage may be valued in summer, as are the curious handlike leaves of five-finger akebia, or in autumn, as are burning bush and many viburnums.

Invasive Plant - Native Alternatives
Acer ginnala - Acer spicatum, Carpinus caroliniana, Cornus alternifolia, Prunus virginiana
Berberis thunbergii - Fothergilla gardenii, Myrica pensylvanica, Ceanothus americanus, Ilex verticillata
Elaeagnus umbellata - Baccharis halimifolia, Morella cerifera, Amelanchier species
Euonymus alatus - Aronia arbutifolia, Fothergilla major, Itea virginica, Rhus copallina
Ligustrum japonicum - Ilex decidua, I. glabra

3. Plants with decorative fruit

Exotic shrubs with decorative fruits are often invasive. While most of the offenders below have fleshy fruits dispersed by birds, some, such as Amur maple, are wind dispersed.

Invasive Plant - Native Alternatives
Ampelopsis brevipedunculata - Ampelopsis arborea, Parthenocissus quinquefolia,
Celastrus orbiculatus - Celastrus scandens, Lonicera tatarica, L. maackii - Aronia arbutifolia,
Cornus stolonifera, Lindera benzoin, Sambucus pubens, Viburnum dilatatum - Callicarpa americana,
Ilex verticillata, Viburnum acerifolium, V. nudum, V. trilobum

4. Plants as problem solvers

These plants are seldom used in ornamental setting. Instead, they are employed to remedy landscape problems, such as erosion, high winds, or and lack of privacy.

Invasive Plant - Native Alternatives
Rhamnus cathartica - Aronia melanocarpa, Crataegus species, Rhamnus Carolinian,
Coronilla varia - Arctostaphylos uva-ursi, Apocynum androsaemifolium, Asclepias verticillata,
Pteridium aquilinum

Invasives List

In this series on invasive plants, C. Colston Burrell discusses many plants that can take over the landscape. Here he provides two lists of additional plants to be wary of. Remember that plants considered invasive in one area of the country may be safe to grow in other areas. Check with your local extension service for regionally specific lists.

Plants Grown As Ornamentals That Are Invasive

Acer platanoides
Ailanthus altissima
Albizzia julibrissin
Arundo donax
Buddleja davidii
Caragana arborescens
Cortaderia selloana/jubata
Cotoneaster species
Euonymus fortunei
Euphorbia cyparissias, dulcis 'Chameleon'
Fallopia japonica (Polygonum cuspidatum)
Foeniculum vulgare
Hedera helix
Hibiscus syriacus
Iris pseudacorus
Ligustrum species
Lonicera japonica
Lotus corniculatus
Melilotus species
Lysimachia nummularia
Miscanthus sacchariflorus
Myosotis scorpiodes
Paulownia tomentosa
Pennisetum alopecuroides
Perilla frutescens
Phalaris arundinacea
Pinellia species
Populus alba
Rhodotypos scandens
Rosa multiflora
Salix species
Sapium sebiferum
Sorbus aucuparia
Tamarix species
Ulmus pumila
Viburnum opulus, lantana, sieboldii
Vinca minor

Plants to Watch

This list includes species that exhibit those traits shared by a number of invasive species. While they may not be invasive in all regions of the country, they bear careful observation and reporting. For information on evaluating the invasive potential of ornamental plants, Sarah Reichard, University of Washington, has developed guidelines. For a copy of the guidelines, see Reichard, S. 1999. A Method for Evaluating Plant Invasiveness. The Public Garden 14(2):19-21.

Angelica gigas
Aralia cordata, continentalis
Arum italicum
Berberis species
Cardamine pratensis and others
Cestrum parqui
Clerodendrum species
Echium species
Geranium x oxonianum and others
Mahonia species
Persicaria (Polygonum) species
Petasites japonicus
Ribes sanguineum