

KEEP IT IN THE GARDEN: INVASIVE PLANTS AND THE NURSERY TRADE

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An estimated 5,000 introduced plant species have escaped and now exist in natural ecosystems in the U.S. (Pimentel et. al 1999). Most introduced species fulfill their intended role and do not interfere with natural processes, however about 12% of intentional introductions cause economic or environmental damage (OTA 1993). These plants are considered invasive because they have spread into ecosystems where they are not native to establish self-sustaining populations without direct human assistance. In the U. S., an estimated 40% of rare, threatened, and endangered species are at risk from these alien invaders (Wilcove et. al 1998).

Horticultural origins of invasive plants

Horticultural stock is a significant source of known and potentially invasive plants. Reichard (1997) determined that 85% of the 235 introduced woody plants that have naturalized in the U.S. were introduced for landscaping and other ornamental purposes. In California, nurseries in the state have propagated 41 of the 78 plants listed on the California Exotic Pest Plant Council's (CalEPPC) list of "Pest Plants of Greatest Ecological Concern". In Florida, 69% of the plants on a similar list developed by the Florida Exotic Pest Plant Council (FL-EPPC) are of horticultural origin. Across the ocean in Australia, the story is much the same: 65% of the invasive plants that have naturalized on the continent over the last 25 years were introduced ornamentals (Groves 1997).

The commercial seed trade was one of the earliest avenues of spread of weeds in the U.S. (Mack, 19991). Prior to the 1860's most seed trade was local, direct from the nurseryman. With the advent of the railroads, widespread mail order became the norm as seed were transported across the country faster than ever. Plants like salt cedar, Scotch broom, and tree-of-heaven became available in the west where the warm climates proved conducive to their spread into natural areas. Weedy alien grasses like goatgrass, pampasgrass, and medusahead were popular plants for the dried Victorian flower arrangements called "immortelles".

A significant proportion of these intentionally introduced ornamental plants have become a serious threat to wildland biodiversity and ecosystem processes for two main reasons. First, a good ornamental plant often has many traits that can also make it a good weed. Horticulturists want plants that are easy to propagate, establish rapidly, mature early, produce abundant flowers, and are environmentally fit and free from major insect and disease pests. The perfect weed has many of the same characteristics: broad germination requirements, early maturity, fast growth, prolific seed production, and few natural predators. Collectively, these traits increase the ability of a plant to survive without human assistance and become established in the wild. Second, several breeding practices in the industry tend to facilitate selection for weedy characters. The

sale of seeds is not only successful at dispersing plants across many different regions, it also selects for hardy seed that lack complicated dormancy mechanisms or germination requirements. Many nursery plants are repeatedly introduced into the landscape where they can reproduce and further increase the genetic variation of existing escaped populations. Hybridization, although useful for creating sterile cultivars, can produce polyploids that are better adapted and more weedy than their progenitors.

Invasive plants for sale

Disagreement exists as to the number of invasive plants that are currently available for sale. Campbell (1998) compiled a list of 452 “worst invasive plant species in the U.S.” (excluding Hawaii) and found that 271 species, or 60%, were for sale through Andersen’s Horticultural Library. While 49% of the herbaceous weeds were for sale, 85 and 73% of trees and shrubs, respectively, were available through the library. Seed catalogs also remain an important avenue of spread of known invaders. More recently, internet sales of nursery stock have skyrocketed and known invaders are available on garden product websites that will ship anywhere in the country.

While the sources of invasive plants are many, it is difficult to assess the magnitude of the problem. Weed invasions are an inherently regional problem. A plant that acts as a noxious weed in one part of the country (or state) may be a perfectly behaved ornamental in another. The industry does not track the sale of individual plant species, so the impacts from banning the sale of a particular plant species cannot currently be determined. Invasive ornamentals probably occupy a small share of the total market, but no one really knows for sure.

The regulatory framework

California has a unique and somewhat complicated regulatory system for the nursery industry. All grower and retail nurseries require a license from the California Department of Food and Agriculture (CDFA) for each location where plants are grown or held for sale. Each year CDFA licenses 3,500 grower nurseries, 3,000 retail nurseries, and 3,500 “incidental dealers” such as supermarkets, drug chains, and big box stores. The California Agricultural Commissioner (CAC) system locally enforces mandates of CDFA and oversees aspects of the agricultural sector including nursery stock and seed inspection. All 58 counties have a CAC that conducts nursery inspections, implements plant or pest quarantines, and carries out control plans.

In California, the regulatory scope extends only to plants listed on the Federal Noxious Weed list or with a CDFA noxious weed rating. The CDFA weed ratings of A, B, C, D, or Q have no legal standing, but are policy and regulatory guidelines that indicate different possible actions. Nurseries must be completely free of A and B-rated pests. C-rated pests are not subject to state action and may be tolerated in nurseries at the discretion of each CAC. Actions against B and C-rated pests in non-nursery locations are also at the discretion of the local CAC.

The central problem with invasive ornamentals plants is that no mechanism exists in the current regulatory framework for controlling the propagation, distribution, and sale of unlisted species with known invasive tendencies. Most invasive plant species are not listed on the federal or state lists, especially those that primarily invade “areas not managed for economic return”.

Reichard (1997) estimated that at least 750 species that meet the definition of the Federal Noxious Weed Act remain unlisted. The current federal noxious weed list has only 96 taxa, 25 of which are species of mesquite (*Prosopis* sp.). Only one of the 78 species on the CalEPPC list is found on the federal list. With 10 new additions this year, 25 species from CalEPPC's list now appear among the approximately 140 plants on the CDFA state noxious weed list.

The horticulture industry up close

As the unintentional source of many invasive plants, the horticulture industry is a major stakeholder in the effort to control invasive plants. According to the USDA Economic Research Service (ERS), the environmental horticulture and floriculture industry is the fastest growing sector of U.S. agriculture. In 1998, grower cash receipts totaled \$12.1 billion. Retail sales for all nursery related crops and products reached \$38.3 billion. The California industry alone generated \$2.4 billion, representing 20% of the total nursery crop production in the country. Other states with a significant proportion of nursery crop production include Florida (11%), North Carolina and Texas (8%).

Levels of awareness about invasive nursery stock vary by region and within different facets of the horticulture industry. Horticulturists are quick to point out the regional nature of weed problems and are strongly opposed to statewide or national bans on most plant species. Many weeds have restricted distributions that make them problematic only in particular settings. Instituting local restrictions on plants in areas where they are known to invade would minimize economic impacts to the industry, but the proportion of the market that would be affected is unknown.

The industry generally favors voluntary guidelines for controlling the spread of invasive species. The threat of nationwide bans, which could pose a significant economic impact, provides a strong incentive for the industry to self regulate and avoid federal or state legislation. Nationwide mandates would require governmental enforcement and may not be perceived as fair. In contrast, voluntary guidelines, paired with a rigorous education campaign, could promote a high level of awareness of the problem. Establishing voluntary guidelines at an academic level would require input from industry, cooperative extension, and government agencies.

What can be done about invasive ornamentals?

A primary obstacle to dealing with invasive ornamental is the lack of agreement on objective criteria for what makes a plant invasive. Clearly establishing such criteria is a critical precursor to defining the issues surrounding invasive horticultural stock and taking steps toward possible solutions. An active dialogue must be maintained between weed scientists and horticulturists on how an invasive species is defined. The issue is not simply native vs. non-native. In the effort to quantify invasive characters, some see an opportunity to rethink current horticultural practices. Increased research on alternatives to invasive species may lead to new cultivars and breeding techniques that could actually increase numbers of new plants and diversify nursery stock.

It is necessary for the horticulture industry to share the responsibility of preventing the spread of existing invaders by discouraging their use in landscape settings and offering non-

invasive alternatives. A rigorous education campaign is required to combat further releases and introductions of invasive exotic plants into California's natural landscapes. It is critical to develop regional lists of invasive ornamental plants that should not be sold in California. It is equally important to increase research efforts in order to provide non-invasive alternatives that will help nursery owners make an informed decision to stop selling known invasive species.

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