



INVASIVE PLANTS AND HORTICULTURE IN CALIFORNIA



LEARNING OBJECTIVES

- Establish the connection between invasive plants and horticulture.
- Identify the economic and environmental impacts of invasive plants.
- Understand current regulations for noxious weeds and invasive plants.
- Recognize what nursery professionals can do to help.
- Learn about additional invasive plant resources.

INTRODUCTION

Plants are an integral part of the human experience. We rely on them in numerous ways – practically, culturally, and aesthetically.

When humans transport a plant around the world, they are helping it make a huge geographic leap it would otherwise be unable to make. Because California has a Mediterranean climate, consisting of wet winters and dry summers, plants brought from similar environments around the world adapt well to California’s climate. A small percentage of foreign plants have adapted so well that they have naturalized and become invasive.

Before a plant is considered invasive,

however, it has to overcome various biological and adaptive challenges in its new environment.¹ The following classifications describe the stages in which a foreign plant might integrate into its new surroundings:

- **NATURALIZED PLANTS:** Adapt to the local environment and reproduce successfully, but do not necessarily spread.
- **WEEDS:** Spread to agricultural, urban or other disturbed lands but still require tillage and/or irrigation to survive.² Note that “noxious weeds” are a regulatory classification explained in the Existing Regulations section on page 7.



HORTICULTURAL PLANTS THAT ARE INVASIVE IN CALIFORNIA

The below list is a starting point from which to build knowledge of specific invasive plant species in California that have gotten their start in horticulture. Other lists of plants that are invasive in your region may be available through local garden and conservation groups, nonprofits and government agencies. Some lists also include non-invasive alternatives that can be used in place of invasives. Can you think of any non-invasive alternatives to these plants?

- INVASIVE PLANTS:** Establish in undisturbed habitats, such as natural forests, grasslands, wetlands or aquatic areas, and *can survive in the absence of human irrigation and tillage.*² An invasive plant is legally defined as a foreign species whose introduction does or is likely to cause harm to the local economy, environment or to human health.³

Because of the diverse climate conditions found within California (mountains, desert, forest, scrub, etc.), a plant that is invasive in one region of the state may not be problematic in another. Please review www.calweedmapper.org for documentation of where each invasive plant is found in the state.

SCIENTIFIC NAME	COMMON NAME
<i>Arundo donax</i>	Arundo, giant reed
<i>Arctotheca calendula</i>	Capeweed
<i>Carpobrotus edulis</i>	Highway iceplant
<i>Cortaderia jubata</i>	Jubata grass
<i>Cortaderia selloana</i>	Pampas grass
<i>Cytisus scoparius</i>	Scotch broom
<i>Cytisus striatus</i>	Portuguese broom
<i>Elaeagnus angustifolia</i>	Russian olive
<i>Eucalyptus globulus</i>	Blue gum
<i>Genista monspessulana</i>	French broom
<i>Mesembryanthemum crystallinum</i>	Crystalline iceplant
<i>Myoporum laetum</i>	Myoporum
<i>Pennisetum setaceum</i>	Green fountain grass
<i>Retama monosperma</i>	Bridal veil broom
<i>Sesbania punicea</i>	Scarlet wisteria
<i>Spartium junceum</i>	Spanish broom
<i>Tamarix ramosissima</i>	Saltcedar
<i>Triadica sebifera</i>	Chinese tallow tree
<i>Vinca major</i>	Big leaf periwinkle

INVASIVE PLANTS AND HORTICULTURE

Garden and landscaping plants are often selected because they are well suited for the conditions in which they are planted and, as a result, perform very well. When used for gardening and landscaping, invasive plants merely perform too well! Their growth can crowd out other plants and be difficult to control.

As represented by the table below, some of the traits that make plants successful in the nursery trade also contribute to their potential for becoming invasive.⁴

In a study of 200 invasive plants impacting wildlands in California, it was found that nearly 50% were introduced as landscape ornamentals (see chart below). While many of

these introductions took place over a century ago, before the plants' invasive tendencies were understood, this highlights that it is pivotal to have the nursery industry's participation in preventing the introduction of new invasive plants to our state. This is especially true as some invasive plants continue to be sold and planted today.^{5, 6}

The good news is that in the past 25 years the nursery industry has introduced over 50,000 ornamental plants to the U.S. and less than 1% of those have become invasive.^{7, 8} Among the other 99% of plants are numerous beautiful, non-invasive alternatives that can be used to fill the same function in one's yard, garden or landscape as the invasives.

SHARED PLANT CHARACTERISTICS

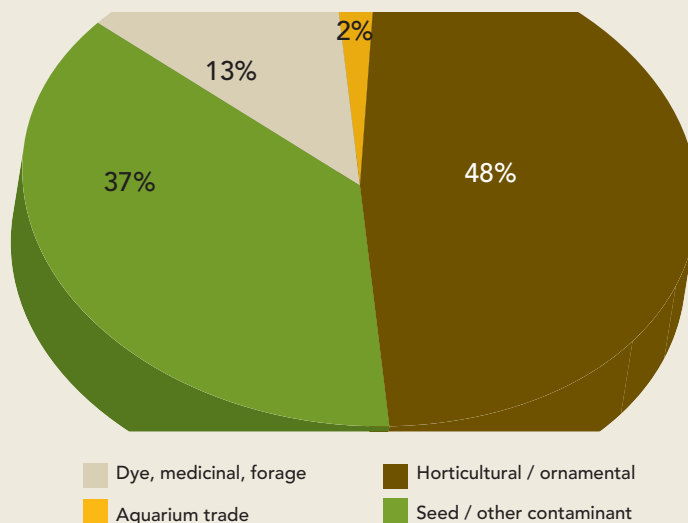
INVASIVE TRAITS

- Broad germination
- Matures quickly
- Monopolizes resources
- Weather / soil tolerant
- Resistant to pests and diseases

ORNAMENTAL TRAITS

- Abundant flowers
- Rapid growth
- Easy to propagate
- Weather / soil tolerant
- Resistant to pests and diseases

SOURCE OF PAST INVASIVE PLANT INTRODUCTIONS TO CALIFORNIA⁹



FROM STORES TO LANDSCAPES



Pampas grass (*Cortaderia selloana*) is shown here in various settings as an example of how an invasive garden plant can progress from (1) for sale in a retail store, (2) growing in one's yard, (3) spreading in the hills near a residential community and (4) fully covering a natural landscape.



ECONOMIC IMPACTS

A considerable amount of time and money has been dedicated to the eradication and control of invasive plants. Nationwide, the financial impact of invasive plants has been estimated to be \$27 billion a year.¹⁰ This estimate includes the impacts of invasive plants on natural systems and the effect this has on human finances, as well as the direct cost of managing these plants in natural areas, agriculture, and gardens.

In California, the cost of control, monitoring, and outreach are more conservatively estimated to be \$82 million a year.¹¹ This does not capture the financial impacts associated with

lost agricultural yields, increased severity of wildfires and floods, loss of productive range and timber lands, reduced land values, damage to infrastructure, and degraded recreational opportunities.

It is far more cost effective to prevent the introduction of new invasive species than to manage those that have already escaped into the wild. Thus, early recognition and interception of invasive plants would reduce the general financial burden of invasive plants on taxpayers and others trying to contain their spread.



Highway iceplant (*Carpobrotus edulis*) is invasive throughout coastal California. Its presence prevents shore birds, like the endangered snowy plover, from nesting among coastal dunes.

ENVIRONMENTAL CONSIDERATIONS

In addition to causing economic harm, invasive plants can negatively impact our state's natural environment. When a plant invades a habitat, it often outcompetes native plants for resources such as light, water and soil nutrients (aquatic plants can even deplete oxygen levels in the water). Over time, this can cause dramatic ecological changes that negatively affect native plants, wildlife, and other organisms. The California Department of Fish and Game estimates that 181 rare plant species are currently threatened by invasive plants. Invasives also degrade

habitat normally used for foraging and nesting by wildlife, and can create ideal cover for predators, increasing predation of native birds and animals.¹²

By changing the vegetative landscape in regions of California, invasive plants have also contributed to the increased frequency and intensity of fire regimes and altered both soil composition and natural hydrologic cycles. Regarding the latter, waterways covered with invasive plants can become deprived of sunlight and dissolved oxygen, leading to dead zones where aquatic life cannot

exist. Invasive plants growing in faster moving waterways have also led to increased flooding. In addition, invasive plants with deep taproots or high transpiration rates can lower the water table and dry up streams. These are a few examples of how invasive plants can impair the natural services that wildlife and people depend on for survival.

EXISTING REGULATIONS

Certain invasive plants are regulated by the California Department of Food and Agriculture (CDFA) and by the U.S. Department of Agriculture (USDA) as noxious weeds. In California, CDFA designates noxious weeds in California Food and Agricultural Code of Regulations (CCR) Section 4500. Plants will then be given a rating based on the

recommended action for that species. Plants can be listed as A, B, C, Q, or H-rated weeds, which prevents or limits their ability to sold at varying degrees. For more information about the ratings, please contact the Agricultural Commissioner in your local county. There are over 240 plants on these lists and the majority are not ornamental plant species.

The CDFA and USDA lists do not encompass all invasive plants sold in our state, however. Many of the horticultural invasive plants can still be sold. Garden and conservation groups, nonprofits and other government agencies have developed regional or statewide invasive plants lists with suggestions of plants that are problematic in that region. Some include non-invasive plants to consider using in their place.

NURSERY PROFESSIONALS' THOUGHTS ON INVASIVES

Independent surveys of the horticultural industry have shown that there is interest among the nursery industry in addressing the issue of invasive plants. For instance, the following percentage of nursery professionals:

49% Have previously removed at least one invasive plant from their inventories¹³

70% Think newly discovered, non-native plants should be screened to determine whether they are invasive before being sold in the U.S.¹³

69% Would not sell a potentially invasive plant to their clients¹⁴

76% Felt responsible for educating their customers about invasive ornamental plants¹⁴

78% Are willing to engage in a majority of the St. Louis Voluntary Codes of Conduct on Invasive Plants¹⁵

55% Think a program recognizing businesses that do not sell invasive plants could be useful in promoting sales¹⁶

83% Are willing voluntarily to label plants as invasive¹⁶

NEW PLANT INTRODUCTIONS

Over the past 30 years, the introduction of new ornamental plants to the nursery trade has grown exponentially. With each new introduction comes the risk of bringing a new invasive plant into California. Looking for signs of invasiveness early in the plants' introduction is the most efficient way of preventing future invasions from taking place and will be of increasing significance as more plants are brought to the market. For this reason, researchers are currently developing science-based tools for predicting which plants will become invasive in the future.

HOW CAN YOU HELP?

The easiest way to reduce the impacts caused by invasive plants is to prevent them from getting into the wild in the first place. The first step for prevention is education. Learn about what plants are problematic in your region through resources like your local Agricultural Commissioner, and nonprofit projects like PlantRight and the California Invasive Plant Council (Cal-IPC). A list of additional resources are listed in the "Learn More" box on the right.

In addition to educating yourself, spreading the word is important since it is the collection of individual actions that will make a difference. Inform your fellow nursery professional, your vendor, and/or your clients about invasive plants in the nursery industry. By choosing to use plants that are not invasive in your area, you are contributing to the sustainability of your local area and joining a larger effort to use plants that are appropriate for the region where they are planted.

LEARN MORE

PlantRight
Horticultural Invasive Plants of California
plantright.org/about-invasive-plants/plant-list/

California Invasive Plant Council
(Cal-IPC)
www.cal-ipc.org/

USDA California Noxious and Invasive Weeds list
plants.usda.gov/java/noxious?rptType=State&statefips=06

Weed Management Areas of California
cal-ipc.org/WMAs/index.php

Early Detection and Rapid Response
www.cal-ipc.org/ip/edrr/index.php

UC Cooperative Extension
Weed Research and Information Center
wric.ucdavis.edu/

CalWeedMapper
calweedmapper.cal-ipc.org/

Invasive Species Council of California
www.iscc.ca.gov

CA Agricultural Commissioners and Sealers Association
cacasa.org

¹ Richardson DM, Daehler CC, Leishman MR, Pauchard A, Pyšek P (2010) Plant invasions: theoretic and practical challenges. *Biol Invasions* 12:3907-3911.

² Bell CE, Wilen CA, Stanton E (2003) Invasive plants of horticultural origin. *HortScience* 38:14-16

³ Executive Order No. 13112, 64 Federal Regulation 6183 of February 3, 1999; Invasive Species

⁴ Anderson NO (2001) New ornamental crops: a primary source of invasive species? *Chicago Botanic Garden, New Ornamental Crops Symposium and Abstracts*: 2629:13

⁵ Reichard SH, Hamilton CW (1997) Predicting Invasions of Woody Plants Introduced into North America. *Conservation Biology* 11(1): 1523-1739

⁶ Mack RN (2005) Predicting the identity of plant invaders: future contributions from horticulture. *HortScience* 40:1168-1174

⁷ Gordon DR, Gantz CA (2008) Screening new plant introductions for potential invasiveness: a test of impacts of the United States. *Conservation Letters* 1:227-235

⁸ Reichard SH, White P (2001) Horticulture as a pathway of invasive plant introductions in the United States. *BioScience* 51:103-113

⁹ Bell CE, Wilen CA, Stanton E (2003) Invasive plants of horticultural origin. *HortScience* 38:14-16

¹⁰ Pimentel D, Zuniga R, Morrison D (2005) Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecol Econ* 52:273-288

¹¹ California Invasive Plant Council (2008) Cost of Invasive Plants in California.

¹² Bell CE, Wilen CA, Stanton E (2003) Invasive plants of horticultural origin. *HortScience* 38:14-16

¹³ Hall M (2000) IPlants: invasive plants and the nursery industry. Web-published by Brown University. Website accessed 24 Nov 2008: http://www.brown.edu/Research/Studies_Theses/full9900/mhall/IPlants/Iplants_Frames.html

¹⁴ Peters WL, Meyer MH, Anderson NO (2006) Minnesota horticultural industry survey on invasive plants. *Euphytica* 148:75-86

¹⁵ Burt, J.W., A.A. Muir, J. Piovita-Scott, K.E. Veblen, A.L. Chang, J.D. Grossman and H.W. Weiskel. 2007. Preventing horticultural introductions of invasive plants: potential efficacy of voluntary initiatives. *Biological Invasions* 9:909-923.

¹⁶ Gagliardi JA, Brand M.H (2007) Connecticut nursery and landscape industry preferences for solutions to the sale and use of invasive plants. *HortScience* 38(1):39-45

PHOTO CREDITS

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 Page 5: Pampas grass 3) by Jason Geissow
 Page 5: Pampas grass 4) by Terri Kempton
 Page 6: Woman pulling Highway iceplant by Save the Bay
 Page 6: Highway iceplant invasion by John Randall, TNC