



University of California, Irvine

# Arboretum Quarterly

For members of the Friends of the UCI Arboretum  
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## Impact of Invasive Exotic Plants on Native Insect Populations

By Tadj Schreck, Graduate Student, Department of Ecology and Evolutionary Biology, UC Irvine

As many plant lovers from Southern California know, our local wildlands are inundated with European annuals planted (purposefully and accidentally) by our predecessors. Some of these annuals have taken a stronghold in our local ecosystems, converting former California Grasslands and Coastal Sage Scrub into monocultures of these invasive



Black mustard (*Brassica nigra*) is a common and aggressive exotic weed in our native ecosystems

Photos provided by Tadj Schreck

changes on the animal communities that native plants typically support.

In my research, I am studying how insect communities are affected by the presence of black mustard. In the spring and summer of 2010, I conducted an experiment at the UCI Arboretum where I grew the native annual fasciated tarweed (*Deinandra fasciculata*) with and without black mustard. I

then collected insects from each tarweed individual to compare how the community of insects differed among plants grown with black mustard and plants grown alone. I also monitored the competition between the tarweed and mustard by collecting the plants at the end of the season and comparing their weights.

Surprisingly, the presence of black mustard did not decrease the weight of the fasciated tarweed, meaning that the tarweed was able to compete well against the mustard. Despite this lack of fierce competition, the insect community was still changed by the presence of the mustard! In the presence of mustard a greater number of herbivores were present on the tarweed, but in a less diverse community. This means that the presence of the mustard had a homogenizing effect on the insect community, increasing numbers of certain insects, while not increasing the number of insect species as a whole. Therefore, not only does black mustard decrease biodiversity in the plant community by outcompeting many plant species, but it also decreases total biodiversity as it decreases insect diversity on native plants.



UCI Graduate student Tadj Schreck sets up her experiment at the Arboretum



# Photo Feature - United States Botanic Garden

by Laura Lyons, Nursery Manager, UCI Arboretum

Located in urban Washington, D.C. just southeast of the iconic US Capitol, the US Botanic Garden is a compact but beautiful jewel of a botanic garden.

The Botanic Garden is actually considered part of the US Capitol grounds. Initial efforts to create a plant facility on the current site were begun in 1821 by an independent society; however, the grounds languished until 1850, when Congress took over the facility and appropriated money to construct the first greenhouses. The site has been managed and funded by Congress since that time.

Originally the Botanic Garden stood roughly in front of the current chambers of the House of Representatives. In 1933 it was moved south to its present location during the expansion of the National Mall.



The main grounds are roughly half outdoors and half covered by a magnificent conservatory. The outdoor gardens include a rose garden, a beautiful water garden, a small seating area for demonstrations and lectures, and a nice garden showcasing the native flora found in the D.C. area and surrounding states.

The conservatory features tropical plants, Hawaiian species, an orchid room, an atrium desert garden, and several other sections dedicated to specific flora.

On pages 2 and 3 you'll find some photos and further descriptions from my visit to our National Botanic Garden. Enjoy!

Sources: Wikipedia ([www.wikipedia.org/](http://www.wikipedia.org/)) and the website of the US Botanic Garden, <http://www.usbg.gov/>



Photos this page: Colorful peony in bloom at the US Botanical Garden (above). The conservatory boasts a variety of interesting specimens, including this magnificent *Alluandia procera* from Madagascar (top right) and a lovely collection of bromeliads (bottom right)



At the front entrance to the garden I was greeted by a taste of home - California native bulbs such as *Calachortus venustus*. They also had species of *Dichelostemma* and *Triteleia* in bloom.

The USBG is roughly half outdoor grounds including a rose garden, water garden, and a native plant garden. The US Botanic Garden also boasts a exceptional conservatory full of tropical plants and a variety of special collections. Specimens include plants from all over the US such as the beautiful *Camassia quamash*, and from around the world, such as *Alluandia procera* from Madagascar

The USBG's collection also included a variety of popular garden plants and hybrids, such as exotic looking bromeliads dramatic drumstick *Alliums* and of course some stunning peonies . Wouldn't it be great if we could grow those here in California....

On a side note, a number of people asked me if I saw any cherry blossoms, but they were long done before I arrived – the bloom is usually early April.

All photos were taken with my Canon digital camera in the floral setting.



Photos this page; *Calachortus venustus* (above), *Camassia quamash* (below), the beautiful water garden on the USBG grounds (above, left) drumstick *Allium* (center, right) and a beautiful hybrid *Dendrobium* (below,





# Digging Into Definitions - What is a Bulb?

By Laura Lyons, Nursery Manager, UCI Arboretum  
reprinted from the *Volunteer Times*

Most gardeners sooner or later find that charming class of flowers known as bulbs wandering into their gardens, be it colorful *Gladiolus*, fragrant hyacinths, bold daylilies, or ruffled tuberous *Begonias*. Each spring and fall we are enticed by boxes full of the latest iris, *Watsonias*, hyacinths, and lilies. The bulbs come in all different shapes and sizes, and each has its own particular planting needs.

Agriculturally, several very important food crops are bulbous in nature, with humans consuming the nutrient rich bulb as food. Potatoes and onions are two crops that immediately come to mind in that regard.

The *New Royal Encyclopedia of Gardening* had what I thought was the best and most complete definition of bulbs as a class: "Bulbs, corms, tubers and rhizomes are all storage organs developed to carry a plant through dormancy during seasons of adverse weather conditions, usually of drought combined with extremes of heat or cold."

The *Sunset Western Garden Book's* definition was similar: "Commonly grouped together as 'bulbs' are a multitude of plants with underground structures (specialized roots or stem bases) that serve as storage organs, accumulating nutrient reserves that will ensure the plant's survival through dormancy and supply energy for its growth and bloom in the year to come."

Let's focus on the latter part of the Royal Horticulture definition for a moment. "... storage organs developed to carry a plant through dormancy during seasons of adverse weather conditions ..." There are certainly evergreen bulbs. Two examples are the popular Southern California landscape plant, *Dietes*, and tall bearded iris, which are often evergreen in our climate. The bulk of bulbs, however, are deciduous. In their native climate, they have some sort of climate extreme to deal with — lack of rainfall, extreme heat or cold. They have adapted to these extremes by completely losing their leaves and going underground for a part of the year.

In California and western South Africa, native bulbs grow during the winter rainy season and are dormant during the dry summers; other bulbs may be dormant in winter, usually due to lack of rain or freezing cold. In general the part of the bulb that persists is partially or completely below ground, protected from extremes of climate. The bulb itself,

and frequently the roots of the plant, survive from year to year. When conditions become more favorable the bulb supplies energy to push up those first sets of leaves and the plant begins another growing season. Later in the season the plant stores sugars manufactured in photosynthesis back in the bulb to support the next growing season.

## A Deeper Look – Rhizomes, Corms and True Bulbs

Let's now shift to the first part of the definition. As gardeners we might have heard reference to tall bearded iris rhizomes, or tuberous *Begonias*, or seen an article on *Gladiolus* corms. But, aren't those all bulbs?

Hobbyists, gardeners and landscape professionals colloquially call all those plants "bulbs." However, if you compare the "bulb" of a tall bearded iris to the "bulb" of a *Gladiolus* it's easy to see they look very different. They are, in fact, derived from different types of plant tissue. This, in turn, can strongly influence how that particular plant grows and how it is planted.

What we colloquially call "bulbs" can be broadly divided into five categories: corms, rhizomes, *true* bulbs, tuberous roots, and tubers. Each type has a unique structure and characteristics.

First and perhaps the most structurally interesting are the *true* bulbs. *True* bulbs come from leaf tissue. The tissue grows in layers and has a disc at the base called the "basal plate" from which both roots and stems emerge. Many of them have a papery covering called a tunic. The most classical example of a *true* bulb is an onion. Tulips, hyacinths, and, here at the Arboretum, *Amaryllis belladonna* all are *true* bulbs. Lilies are as well, and there the



This cross section of an *Amaryllis belladonna* bulb shows the layers of scales that make up a *true* bulb. The basal plate is also visible in this cross section, with the roots emerging from the bottom.



scaling is the most obvious, as lilies lack the papery coating or tunic all the former examples possess.

Many but not all of the bulbs are buried partially above ground – think of planting your Christmas *Amaryllis*. A strong exception is those bulbs that, like lilies, lack a tunic. The bulb is much more vulnerable to desiccation without a tunic's protection and is always planted completely underground. When buying lily bulbs make sure all the scales are moist and plump; if they've been sitting around a nursery for a while the bulb might have dried out. They are frequently packaged in peat moss to protect them from this fate.

Corms, on the other hand, come from stem tissue. They lack the layered tissues of a *true* bulb but do still sport a basal plate and also a tunic, formed from old leaves. Most corms are buried entirely underground. *Gladiolus*, *Wasonias*, *Sparaxis*, and many of the other popular South African species are actually corms.

If you're a fan of tall bearded iris, like I am, you're very familiar with a rhizome. Rhizomes also come from stem tissue, are frequently rather elongated, and often part of the rhizome protrudes above the surface. Besides the aforementioned tall bearded iris, calla lilies, ginger, and even several ferns arise from a rhizome.

Tuberous roots, as their name implies, come from root tissue and thus are always buried below ground. Showy, tuberous dahlias are the most classical example of this group.

The final group are what are known as the "true" tubers; they also arise from root tissue, so, like tuberous roots, are

always buried below ground. The most popular example would be the potato, but showy tuberous *Begonias* also belong to this group, as do *Cyclamen*.

There are a couple more exotic groups that fall under the name bulb. Certain orchids, most notably *Cymbidiums*, sport bulb-like growths above ground, commonly referred to as pseudobulbs.

Much rarer is the plant that sports a caudex – a large, above-ground-storage organ with a hard covering to prevent desiccation. There are not any plants common in horticulture that sport a caudex, but the Arboretum has a couple examples — aren't we supposed to be home to the weird and wonderful?

After twenty years at the Arboretum, bulbs are certainly a topic near and dear to my heart. I've learned so much over the years about their growth characteristics, their quirks, their structure. They are remarkable survivors, and always fun to grow. Knowing the characteristics of the different classes — *true* bulb or tuber, rhizome or caudex — can prevent us from making costly mistakes and help us get the best results from our plants. Tuber or rhizome, you can get quite a bit of "wattage" from these bulbs, given the chance!

### **Bibliography**

*Sunset Western Garden Book*, 7<sup>th</sup> edition, 2001. Sunset Publishing Corporation, Menlo Park, CA. Pages 659-661.

*New Royal Encyclopedia of Gardening*, 1992. Stockton Press, New York, New York. Pages 417-423.

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## Arboretum Calendar Fall 2011

Planting workday Oct. 8  
9 a.m. to noon

Arboretum closed,  
Veterans Day    Nov. 11

October 15 Fall Perennial  
sale  
10 a.m. to 3 p.m.

Fall Clearance Sale  
November 12  
9 a.m. to 3 p.m.

*Friends preview 9 a.m. Saturday*