



## Research paper

# The evolution of tree nursery offerings in Los Angeles County over the last 110 years

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## HIGHLIGHTS

- We investigated nursery tree offerings from 1900 to 2010 in Los Angeles County.
- The diversity offerings increased significantly.
- Tree nursery offerings may provide insights about the diversity of urban trees.

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## ABSTRACT

Interest in urban vegetation has increased dramatically. Urban trees are an important aspect of the urban environment but there is little known about the potential sources of those trees, change in tree species diversity over time and the factors leading to the contemporary floristic composition in cities. We investigate tree nursery offerings in Los Angeles County over the past 110 years through the use of here-to-fore unexplored nursery catalogs to determine the diversity of trees that have been commercially available over time. Tree species information was collected spanning a 110-year study period and analyzed the data for four time periods (1900–1929, 1930–1959, 1960–1989, and 1990–2011). We found the number of genera and tree species offered significantly increased in the past 20 years (1990–2011). The numbers of non-native trees, angiosperms, and deciduous species all significantly increased with but no changes were observed in the numbers of native, evergreen, or gymnosperm species offered over this time period. The largest numbers of palm species were offered in 1900–1929. Overall there were 562 unique species offered belonging to 201 different genera in the 120-year study period, 48 species were California native trees and 514 of these were non-native species indicating that perhaps Los Angeles has one of the most diverse number of tree species offered for sale by the nursery industry.

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## 1. Introduction

Urban trees are garnering increasing attention in this era of interest in biodiversity and urban sustainability. There is growing recognition that urban areas are largely the result of human decisions and actions – they are constructed spaces. When cities are designed and built, for example, local vegetation is usually removed, and the earth recontoured and/or excavated to facilitate construction. Trees and other types of vegetation are then

planted in this new built environment (Francis, Lorimer, & Raco, 2011; Pincetl, 2012). The species chosen can be culturally, historically, or functionally significant, but it is logical to think that species planted are generally representative of species available from the local nursery industry at the time and may or may not draw from the native flora of a regional ecosystem (for the purposes of this paper, the region is defined as Los Angeles County, 10,578 km<sup>2</sup>). Regional nursery catalogs as a data source for urban biodiversity have not been evaluated prior to this research. Yet, the horticultural industry has been shown to be an important contributor to regional biodiversity with regard to invasive species distributions (Drew, Anderson, & Andow, 2010; Reichard & White, 2001). This paper contributes to the literature on urban biodiversity by suggesting that plants offered by nurseries are a source of yet-to-be-explored diversity in cities. We hope that this research will

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encourage the further consideration of the role of nurseries in urban biodiversity.

The significant historical legacy of tree introductions by European and Eastern U.S. settlers in California likely accounts for the initial urban tree diversity of Los Angeles and Southern California. The early 17th-century missionaries came with a culture of planting both crop-yielding and ornamental trees (Niemann, 2002; Padilla, 1961; Rowan, 1957; Willard, 1901) and this tree palate was substantially supplemented with the advent of the intercontinental railroad and increased oceanic traffic connecting Southern California with the world in the 19th Century. An innovative horticultural industry emerged in California which both catered to, and shaped the tastes of, settlers (Padilla, 1961; Taylor & Butterfield, 2003). Today Los Angeles has an exceptionally diverse tree assemblage where the imprint of this early period can still be detected. Referred to as the Garden of Eden, Paradise, and the Garden of the Hesperides throughout its relatively young history, images from this region spread worldwide (Chytry, 2006; Padilla, 1961; Willard, 1901).

There are a number of historical and social factors that can shape and influence tree species composition and diversity in cities beyond biophysical ones such as climate, environment, and ecological factors (de la Maza, Hernandez, Bown, Rodriguez, & Escobedo, 2002; Grove et al., 2006; Hope et al., 2003; Jim & Liu, 2001; Kendal, Williams, & Williams, 2012; Kinzig, Warren, Martin, Hope, & Katti, 2005; Kirkpatrick, Daniels, & Zagorski, 2007; Kunick, 1987; Lubbe, Siebert, & Cilliers, 2010; Martin, Warren, & Kinzig, 2004; Schmid, 1975; Talarchek, 1990; Welch, 1994). Cultural factors (Fraser & Kenney, 2000; Head & Atchison, 2004), and factors related to symbolic and representational associations of trees (Thayer & Atwood, 1978; Ulrich, 1986; Dwyer, Schroeder, & Gobster, 1991; Relf, 1992; Hansen-Moller & Oustrup, 2004) are also important. However, one possible critical factor in the planting and distribution of trees in the urban environment that has not been investigated previously, and is certainly related to the factors above, is the selection of tree species available from the nursery industry of the region. People obtain trees from purveyors, and thus this article examines the evolution of the selection of trees available from tree nurseries and seed availability. If there is no stock or seeds locally available, the burden of finding a desired tree is much higher. Thus we suggest that a window into which trees are found in the urban fabric may be by examining nursery catalogs over time.

This paper describes results from a longitudinal study of nursery offerings of tree species from 1900 to 2010. Los Angeles County has around 6 million trees in a bioregion that naturally supported trees only along riparian corridors and along the foothills of the city-region (Nowak, Hoehn, Crane, Weller, & Davila, 2011; McPherson, Simpson, Xiao, & Wu, 2011). As Schoenherr (1992) and Rundel and Gustafson (2005) have documented, in pre-colonial rismontane Southern California was dominated by chaparral and coastal sage

scrub. Trees were mostly found in riparian corridors and along the foothills and included 14 native species. To understand the role of the landscape nursery industry in influencing diversity of the tree canopy cover, we developed three main areas of inquiry. First, we examined whether there has been a significant change in the number of tree genera and species offered by tree nurseries over time. Second, we asked whether there have been significant changes in the functional classifications of trees (natives, non-natives, evergreen, deciduous, angiosperms, gymnosperms, palms) offered over time. Finally, due to the size of the data set we were curious to know whether some species had been offered consistently from the early 1900s to 2011.

## 2. Methods

### 2.1. Study area

The focus of this research is Los Angeles County, established in 1850 as one of the counties in the State of California. Los Angeles County has a land area of 10,578 km<sup>2</sup> and has a population of about 10.4 million (County of Los Angeles Annual Report 2008–2009, 2010). The region is characterized by a Mediterranean climate with average annual precipitation of 394 mm and average daily high/low temperatures of 20.05 °C/9.2 °C in January and 29.3 °C/18.7 °C in August recorded at the downtown Civic Center (County of Los Angeles Annual Report 2008–2009, 2010). Los Angeles County includes 88 cities as well as 140 unincorporated areas (County of Los Angeles Annual Report 2008–2009, 2010). It was once the most fertile and productive agricultural region in the U.S. (Surls & Gerber, 2010).

### 2.2. Nursery catalog data collection

The limited historical documentation available from the California Department of Food and Agriculture was supplemented with archival catalogs. We located two nursery catalog collections in the region: (1) Collection of Nursery Catalogs (Collection 1207) in the Department of Special Collections located in the Charles E. Young Research Library, University of California, Los Angeles, and (2) the collection of catalogs available at the Los Angeles County Arboretum and Botanic Garden Library. (3) The 2009 and 2011 catalogs of West Covina Nurseries and Monrovia Nurseries, both large and well known nurseries in the region, were accessed on the company's websites respectively (Table 1). We exclusively utilized catalogs of nurseries located in Los Angeles County.

Data collection involved manually transcribing tree species information from each catalog into a database for further analysis. Species that were 12 feet (3.6 m) and taller were classified as trees in this analysis. Images of the catalog pages were scanned and converted to text using optical character recognition

**Table 1**

List of nurseries sampled in this article with year of publication, source, and city of location.

Number	Nursery	Year	Source	City
1	Johnson & Musser Seed Company	1906	UCLA	Los Angeles
2	Winsel Nurseries	1916	UCLA	Los Angeles
3	Paul J. Howard's Flowerland	1924	UCLA	Los Angeles
4	Mission Nurseries	1940	UCLA	San Gabriel
5	Vosburg's Garden Center	1950	Arboretum	Glendale
6	Burkard Nursery Inc.	1962	Arboretum	Pasadena
7	Olle Olson Nursery Inc.	1971	Arboretum	Monrovia
8	Mayflower Nurseries Inc.	1980	Arboretum	Gardena
9	Norman's Nursery	2005	Arboretum	San Gabriel
10	West Covina Nurseries	2009	Arboretum, website <sup>b</sup>	La Verne
11	Monrovia	1937, 1951, 1958, 1970, 1981, 1993, 2004, 2011	Arboretum, website <sup>a</sup>	Azusa

<sup>a</sup> <http://monrovia.com/plant-catalog/>.

<sup>b</sup> <http://wcnurseries.com>.

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