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# Are natives the Answer?

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Monday, August 20, 2012

## Are Natives the Answer? Professor Cregg, Why Are You Asking?

Introduction by Laurie Sheldon  
Article by Taryn Evans

### Background

The Seattle Department of Planning and Development is focused on long-term green priorities (water and material conservation, sustainable transportation and healthy landscapes) and working on a draft of some new "Green Code Provisions." These provisions were presented to the public on August 13, 2012. Comments and questions were encouraged.

The "Healthy Landscapes" component of the "Green Code Provisions" outlines the following initiatives:

The Florida Native Plant Society

GoodSearch: You Search...We Give!

facebook

https://blogs.extension.org/gardeningprofessors/tag/native-plants/page/2/

The Garden Professors™  
Science-based gardening information

Tag Archives: Native plants

## Are natives the answer?

December 14, 2009 | Uncategorized | #michigan, native plants, trees | Bert Cregg

Last week Jeff kicked off a lively discussion about invasive plants. Let me state up front that no one on this blog is promoting invasive plants. But the issues surrounding invasive plants are extremely complex and have profound

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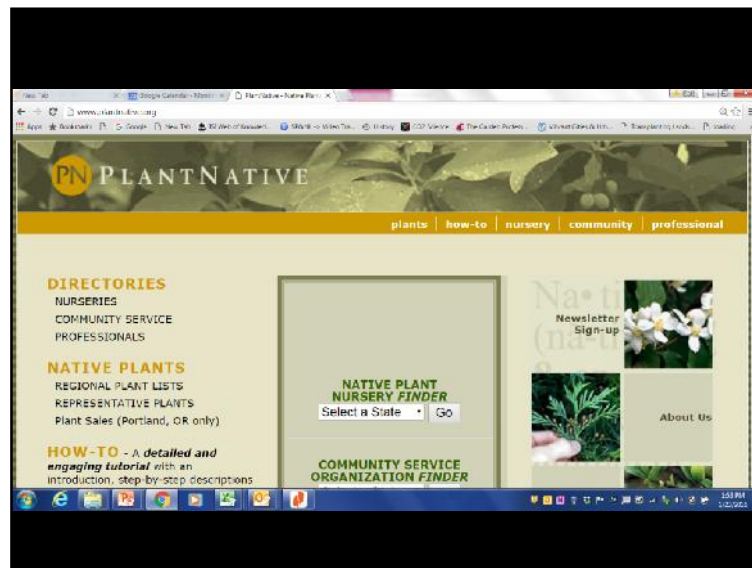
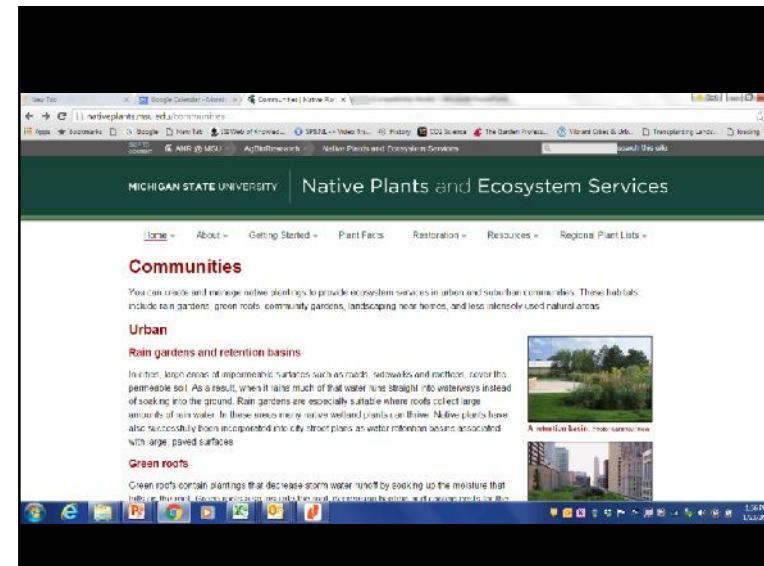
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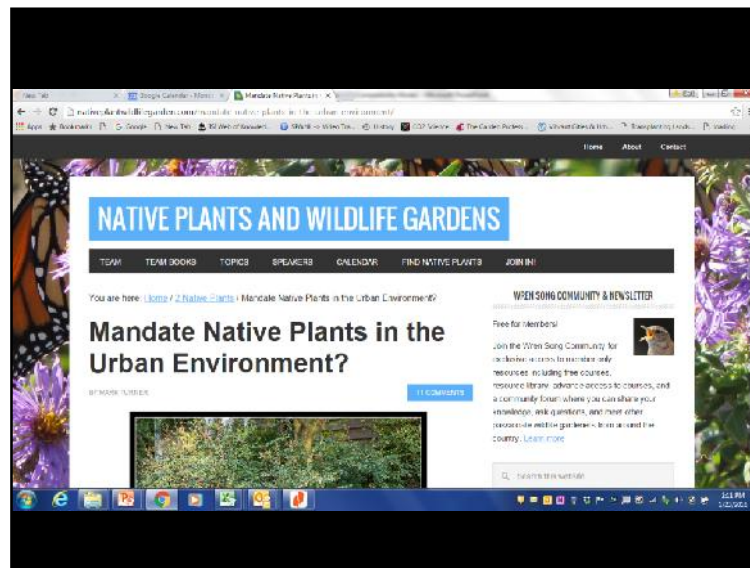
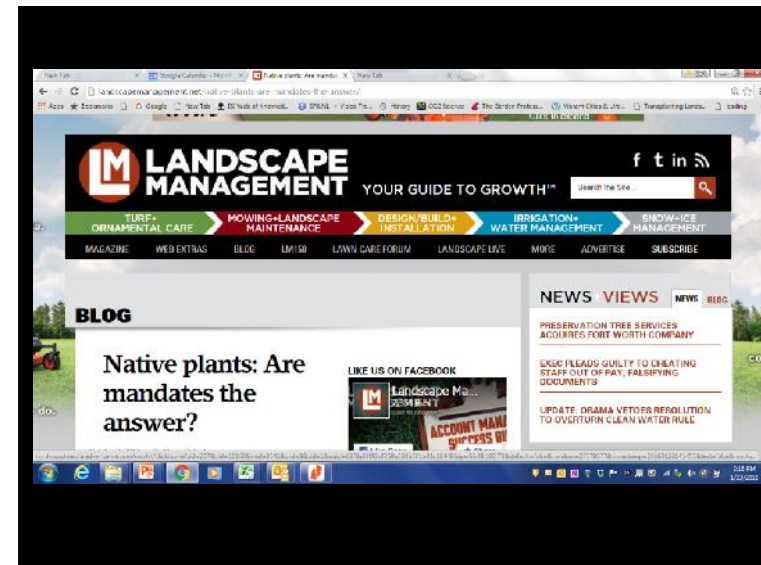


## Lower Merion breaking ground in mandating native plants



with Bray's roll's plant and master focus trees, a native plant, at the Pricer Vale Business Center in Valley. "It just makes sense to use natives," he says. (GWM/AL/Sm/3Bair/photography)

Source: Philadelphia Inquirer



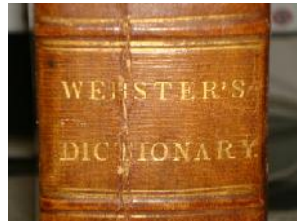
## The case for natives

- Adaptedness
- Enhancing Biodiversity
- Creating a Sense of Place
- Preventing Invasives

## Definitions

When I use a word it means just what I choose it to mean — neither more nor less

Humpty Dumpty in Lewis Carroll's "Through the Looking Glass"



"Native species" means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

"Ecosystem" means the complex of a community of organisms and its environment.





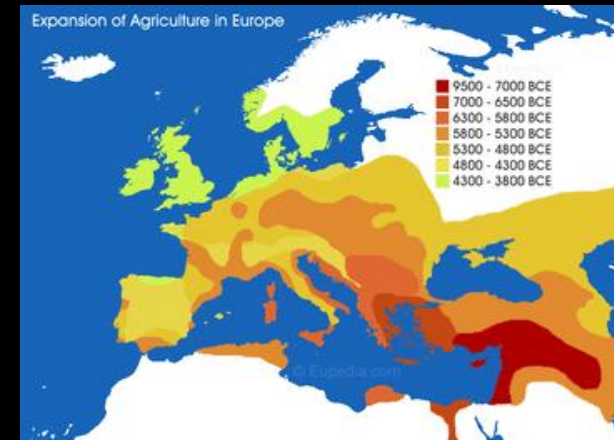
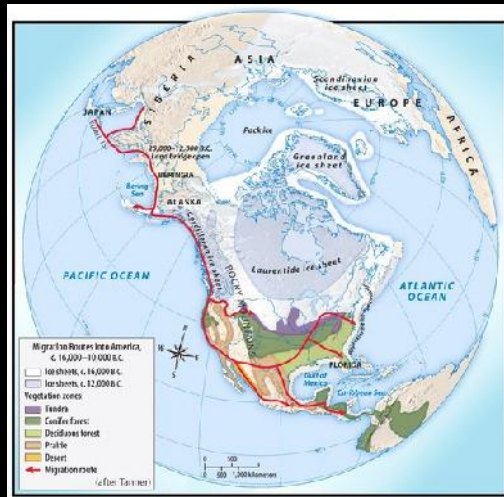
"Alien species" means, with respect to a particular ecosystem, any species that is not native to that ecosystem.

= "Exotic"

= "Non-native"



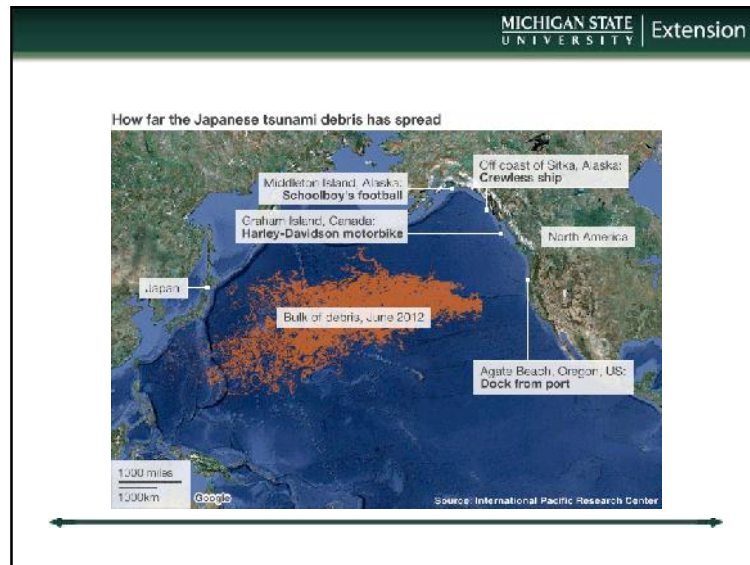
"Introduction" means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.



What about non-human introductions?







## Adaptedness

"They (natives) do not require watering (except during establishment), chemical pesticides and fertilizers, or frequent cutting."  
plantnative.org

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## Adaptedness

"Native plants grow well together (they evolved growing along side one another) and to predictable sizes."  
plantnative.org

## Adaptedness

"They are adapted to local conditions and to local 'bugs'"

plantnative.org

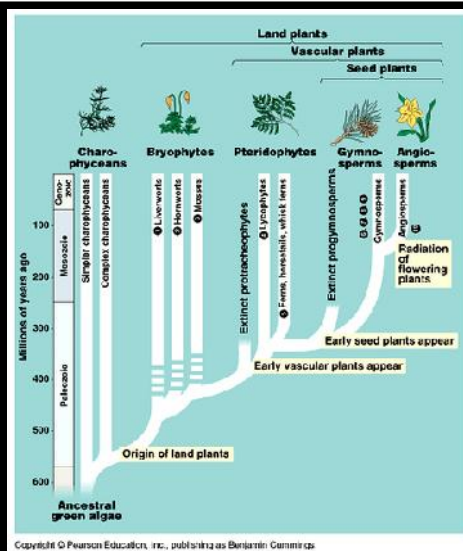


## An Evolutionary Perspective on Strengths, Fallacies, and Confusions in the Concept of Native Plants

Stephen Jay Gould

An important, but widely unappreciated, concept in evolutionary biology draws a clear and careful distinction between the historical origin and current utility of organic features. Feathers, for example, could not have originated for flight because five percent of a wing in the early intermediary stages between small running dinosaurs and birds could not have served any aerodynamic function (though feathers, derived from reptilian scales, provide important thermodynamic benefits right away). But feathers were later co-opted to keep birds aloft in a most exemplary fashion. In like manner, our large brains could not have evolved in order to permit modern descendants to read and write, though these much later functions now define an important part of modern utility.

Similarly, the later use of an argument, often in a context foreign or even opposite to the intent of originators, must be separated from the validity and purposes of initial formula-

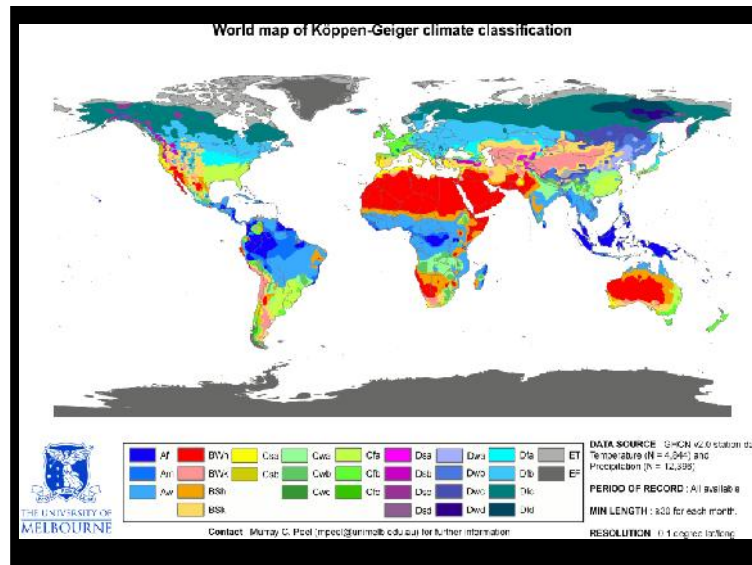


## Evolution and natural selection

- Presumes evolution results in optimal fitness
  - Result of random natural introductions
  - World is full of stressful environments
  - Same suite of physiological adaptations can evolve independently (convergent evolution)







## Native environment?



- Thus, the first-order rationale for preferring native plants – that, as locally evolved, they are best adapted – cannot be sustained.”

-Stephen Jay Gould

## Native environment?



## Native environment?

- Most landscapes are impacts by some form of human disturbance
- Above ground – urban heat island
- Below ground – soil disturbances



## Urban Soils



## Urban Heat Island



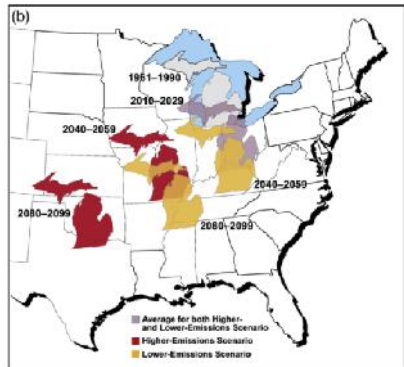
austintexas.gov

## Exotic pests

- Ever-narrowing list of natives
- Globalization is not ending



### Projected impacts of climate change in the Midwest



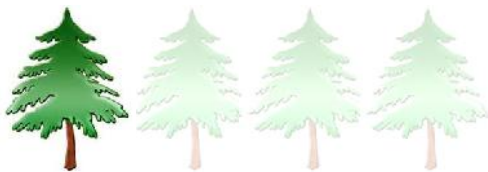
Keyhoe et al. 2010. *J. of Great Lakes Res.* 36 7–21.

### The case for natives

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### Adaptedness

- Strength



### Enhancing Biodiversity

- Ecosystems are interconnected assemblages of organisms – removing one piece can affect all others

“Ecosystems are not only more complex than we think, they are more complex than we can think”







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Enhancing biodiversity Issues of scale?		
Plant resource	Natives needed?	Comments
Shelter	Not likely	Plant structure is more important than species
Pollen and nectar	Evidence suggests not	Although some insects require particular flower shapes, these are found in non-natives as well as natives
Leaves for herbivores	Sometimes	Many insects eat a large variety of plant species, but some are specific to one or two native plants.
Dead material for detritus eaters and decomposers	Not likely	Palatability is more related to woodiness, and the amount of food available relates to plant size not native status
Source: Head and Thompson		

ECOLOGY LETTERS  
Ecology Letters, (2015) 18, 1087–1098 doi: 10.1111/ele.12192

**LETTER** Not all non-natives are equally unequal: reductions in herbivore  $\beta$ -diversity depend on phylogenetic similarity to native plant community

Karin T. Burghardt<sup>1,2\*</sup> and Douglas W. Tallam<sup>3</sup>

<sup>1</sup>Department of Entomology and Wildlife Ecology, University of Delaware, Newark, DE 19716-2103, USA; <sup>2</sup>Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT 06511, USA; <sup>3</sup>Correspondence, E-mail: karin.burghardt@yale.edu

**Abstract**  
Effects of host plant  $\alpha$ - and  $\beta$ -diversity often confound studies of herbivore  $\beta$ -diversity, hindering our ability to predict the full impact of non-native plants on herbivores. Here, while controlling host plant diversity, we examined variation in herbivore communities between native and non-native plants, focusing on host plant relatedness and spatial scale after the result. We found lower absolute magnitudes of  $\beta$ -diversity among tree species and among sites on non-natives in all comparisons. However, lower relative  $\beta$ -diversity only occurred for immature herbivores on phylogenetically distinct non-natives vs. natives. Locally in that comparison, non-native gardens had lower host specificity; while among sites, the herbivores supported were a redundant subset of species on natives. Therefore, when phylogenetically distinct non-natives replace native plants, the community of immature herbivores is likely to be homogenised across landscapes. Differences in communities on closely related non-natives were smaller, but displayed community shifts and increased generalisation on non-natives within certain feeding guilds.

**Keywords**  
Beta diversity, feeding guild, herbivore, host specificity, insects, managed landscapes, native plant, non-native plant, spatial scale.

Ecology Letters (2015) 18, 1087–1098

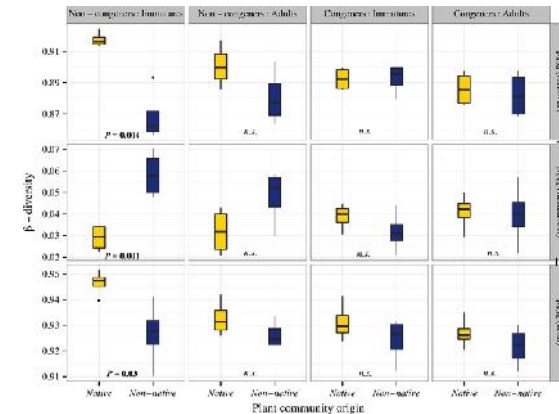
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Genetic relatedness	
• Kingdom	
– Division	
• Class	
– Order	
» Family	
• Genus	
• Species	

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Congener	
	White oak      English oak
• Kingdom	Plantae      Plantae
• Division	Magnoliophyta      Magnoliophyta
• Class	Magnoliopsida      Magnoliopsida
• Order	Fagales      Fagales
• Family	Fagaceae      Fagaceae
• Genus	Quercus      Quercus
• Species	alba      robur

## Non-congener

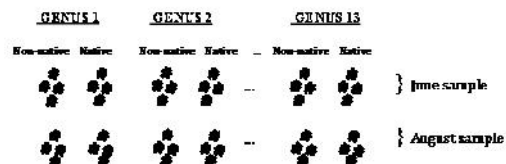
	<u>White oak</u>	<u>Ginkgo</u>
• Kingdom	Plantae	Plantae
• Division	Magnoliophyta	Ginkgophyta
• Class	Magnoliopsida	Ginkgoopsida
• Order	Fagales	Ginkgoales
• Family	Fagaceae	Ginkgoaceae
• Genus	Quercus	Ginkgo
• Species	alba	biloba

## Relatedness matters: Diversity index of native and non-native landscapes

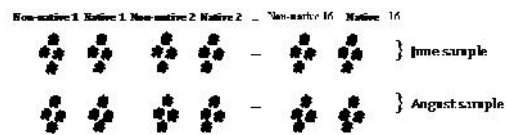


Burghardt and Tallamy. 2015 *Ecology letters* 18: 1087-1098.

### a. Congeneric comparison



### b. Non-congeneric comparison



Site 1 of 4

Burghardt and Tallamy. 2015 *Ecology letters* 18: 1087-1098.

## Journal of Applied Ecology

Journal of Applied Ecology 2015

doi: 10.1111/1365-2656.12499

### Enhancing gardens as habitats for flower-visiting aerial insects (pollinators): should we plant native or exotic species?

Andrew Salisbury<sup>1</sup>\*, James Armitage<sup>1</sup>, Helen Bostock<sup>1</sup>, Joe Perry<sup>2</sup>, Mark Tatchell<sup>3</sup> and Ken Thompson<sup>1</sup>

<sup>1</sup>Royal Horticultural Society, RHS Garden Wisley, Woking Surrey GU24 0RH, UK; <sup>2</sup>Orkney Islands Council, Kirkwall, Orkney, Shetland, Orkney Islands, UK; and <sup>3</sup>Department of Animal and Plant Sciences, University of Sheffield, Western Bank, Sheffield S10 2TN, UK

#### Summary

1. Domestic gardens typically consist of a mixture of native and non-native plants which support biodiversity and provide valuable ecosystem services, particularly in urban environments. Many gardeners wish to encourage biodiversity by choosing appropriate plant taxa. The value of native and non-native plants in supporting animal biodiversity is, however, largely unknown.

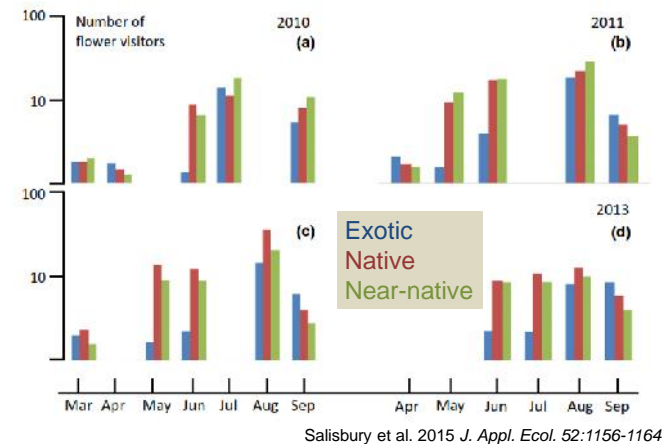
## Native, Near-native, Exotic

**Native.** A species that arrived in the British Isles without anthropogenic intervention.

**Near-native.** A species occurring naturally only in the Northern Hemisphere but not native or naturalized in the British Isles, matched in terms of general growth habit and garden usage with one of the species chosen as a native plant and taxonomically related to it at familial, and usually generic, level.



## Pollinator visits were similar for native and near-native plants



## Native, Near-native, Exotic

**Exotic.** A species occurring naturally only in the Southern Hemisphere, matched in terms of general habit and garden usage with one of the species chosen as a native plant but not necessarily related to it at any particular taxonomic rank and not naturalized in the British Isles.



## Synthesis and application

“Gardens can be enhanced as a habitat by planting a variety of flowering plants, biased towards native and near-native species but with a selection of exotics to extend the flowering season and potentially provide resources for specialist groups.”



Salisbury et al. 2015 *J. Appl. Ecol.* 52:1156-1164

Table 2.6. Comparison of the Natural Forest Tree Species Richness to Urban Forest Tree Species Richness.

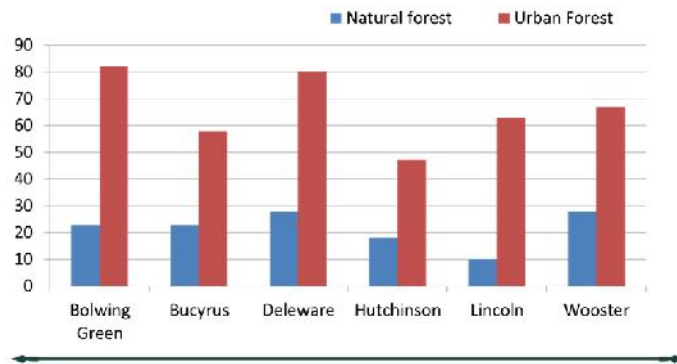
	Natural Forest Species Richness	1980 Urban Forest Species Richness	2003/2005 Urban Forest Species Richness
Bowling Green	21 - 25	75	82
Bucyrus	21 - 25	54	58
Delaware	26 - 30	67	80
Hutchinson	16 - 20	48	47
Lincoln	< 10	62	63
Wooster	26 - 30	62	67
Average	18.3 - 23.3	61.3	66.2

## Improving biodiversity

- Strength



## Tree species diversity (Species Richness) in Midwestern communities



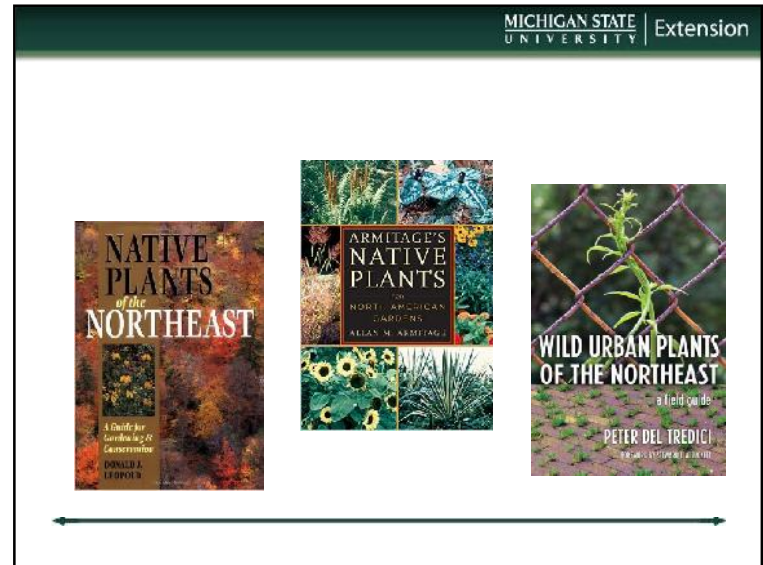
Adapted from Wade 2010

## The case for natives

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Wildflowersmich.org

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*Landscape Research, Vol. 32, No. 3, 379–383, June 2007*

Routledge  
Taylor & Francis Group

SHORT COMMUNICATION

## Native Plants: A Nazi Obsession?

FRANK UEKÖTTER  
Fakultät für Geschichtswissenschaft, Universität Bielefeld, Germany

**ABSTRACT** *This article seeks to challenge recent narratives about Nazi policies against non-native species. Drawing on heretofore ignored evidence and recent publications that draw a more nuanced picture of Nazi Germany's environmental history, it argues that the topic of non-native species was in fact open to debate in Nazi Germany, without a clear preference for a certain position, let alone a state doctrine. Some people argued that Nazi ideas called for a preference for native plants, while others disagreed or even ridiculed that position without fear of prosecution or worse. Furthermore, it seems that those who argued for native species did so out of opportunistic*

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## Are preferences for native plants a form of xenophobia?

### The Native Plant Enthusiasm: Ecological Panacea or Xenophobia?

Gert Gröning and Joachim Wolschke-Bulmahn

Over the last two decades, landscape designers have tended to avoid the use of plants that are labeled exotic, or non-native. Many professionals and laypeople who are interested in nature, landscape, and gardens assume that what they believe are indigenous, or native, plants are unquestionably better than those that are not.

became native seems to have faded. Not long ago the late Stephen Jay Gould offered a fascinating discussion of the concept of native plants: "this notion encompasses a remarkable mixture of sound biology, invalid ideas, false extensions, ethical implications, and political usages both intended and unanticipated." Natives, according to Gould,

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## Creating sense of place

- Strength

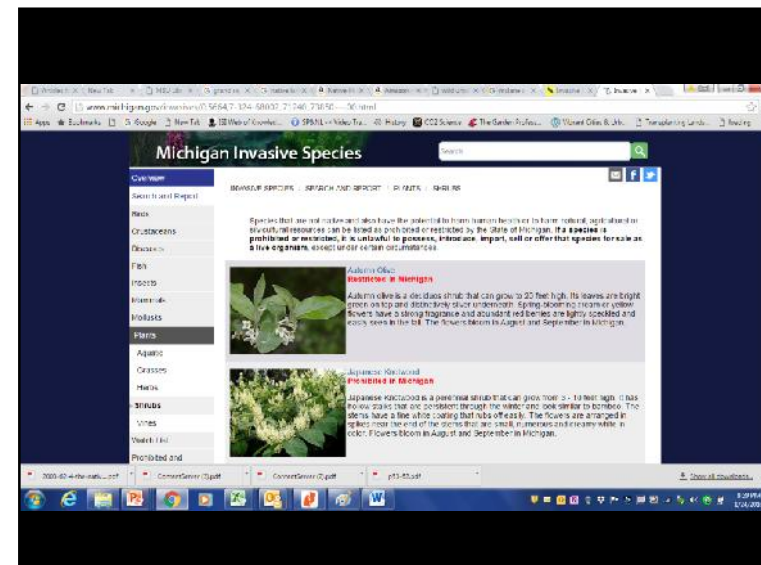


## The case for natives

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"Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

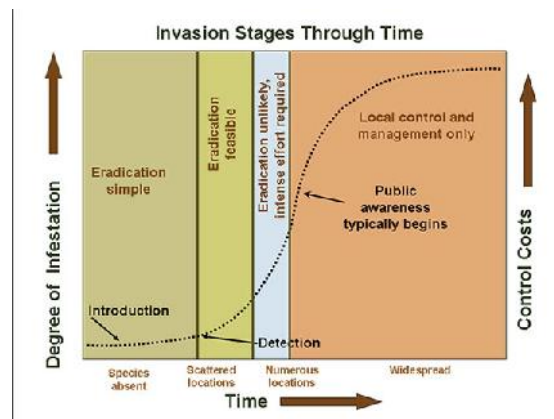
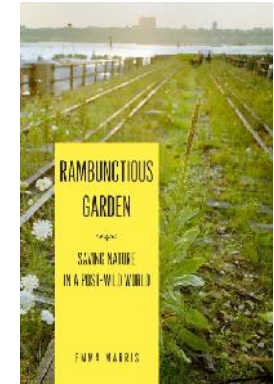


- Introduction
- Escape
- Naturalized – self-sustaining population
- Invasive

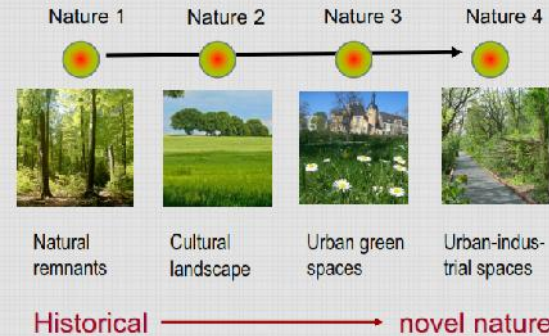


## Don't judge species on their origins

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.



## Urban transformations (Kowarik 1991, 2011)





**Novel urban woodland** dominated  
by an invasive species (*Robinia*)

- => regulating & cultural services
- => well adapted to (climate) change
- => invasion risks manageable (dispersal limitation)
- => Nature conservation area in Berlin!



## Summary

- Arguments over the relative merits of native vs exotic plants are rooted in both biology and value systems
- The adaptedness argument for natives is weak, especially in disturbed environments

## Preventing invasives

- Strength



## Summary (cont.)

- The 'sense of place' argument is often shunned by ecologists, but not necessarily by public
- The biodiversity discussion related to native/exotic is becoming increasingly nuanced (provenance, near-native, congener)

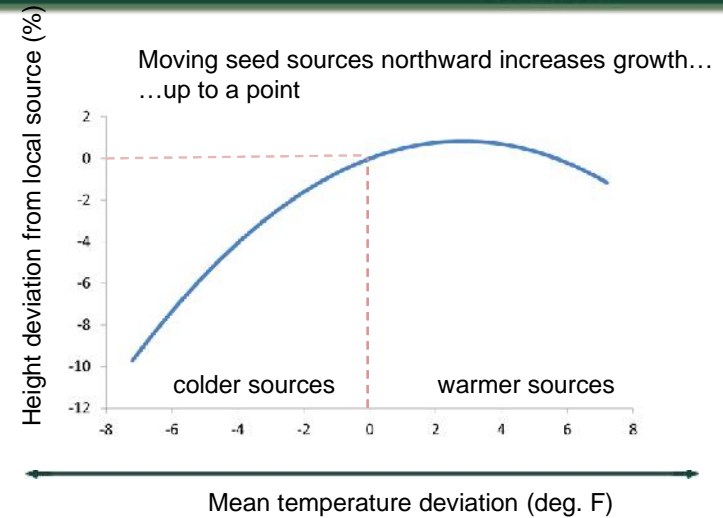
## Summary (cont.)

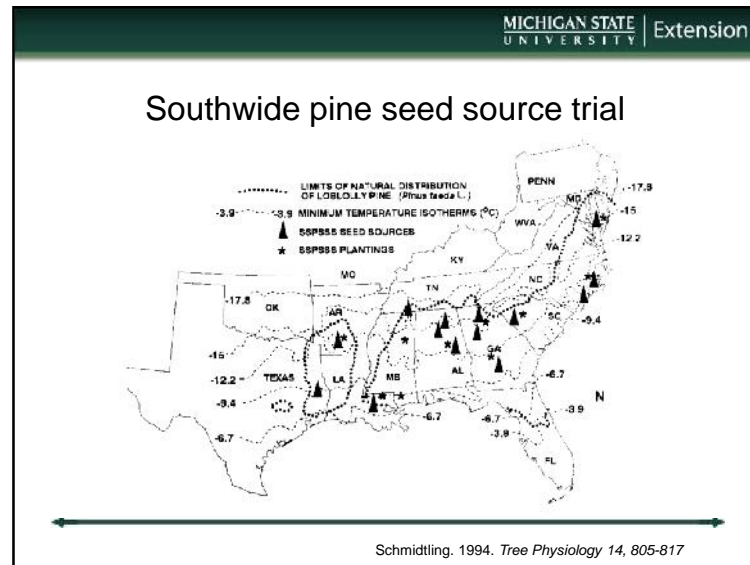
- Natives can be a hedge against invasives but the utility of this approach is not universally accepted



## What about cultivars of native plants?

- Provenance?
- Clonally propagated
  - Reduces genetic variability
- Often grafted
  - Root stock origin?

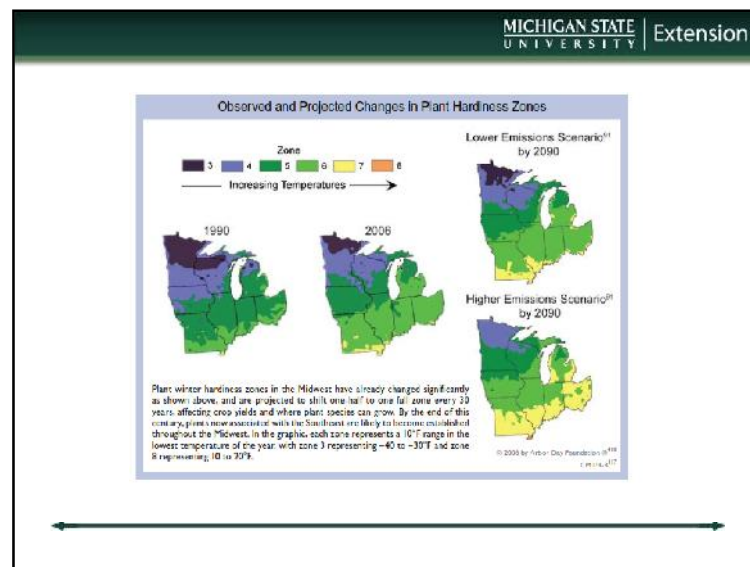




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**Table 1** Ecosystem services, as defined by the Millennium Ecosystem Assessment (2005), and examples of their provision by invasive trees

Category	Example service	Major invasive tree genera commonly providing this service <sup>2</sup>
Cultural	Shade	<i>Acacia</i> , <i>Chorizanthe</i> , <i>Eucalyptus</i> , <i>Jacaranda</i> , <i>Pinus</i> , <i>Tamarix</i>
	Visual amenity/ornamental	<i>Acacia</i> , <i>Ulmus</i> , <i>Jacaranda</i> , <i>Larix</i> , <i>Pinus</i> , <i>Pseudotsuga</i> , <i>Rhamnus</i> , <i>Spatholobus</i> , <i>Tamarix</i>
Provisioning	Romantic treys, privacy	<i>Eucalyptus</i> , <i>Pinus</i> , <i>Nyssa</i> , <i>Salix</i>
	Honey production	<i>Eucalyptus</i> , <i>Metelaria</i> , <i>Robilia</i>
	Timber, building materials, poles, posts, pulp, crafts	<i>Acacia</i> , <i>Ulmus</i> , <i>Eucalyptus</i> , <i>Larix</i> , <i>Pinus</i> , <i>Pseudotsuga</i> , <i>Pinus</i> , <i>Robilia</i> , <i>Tamarix</i>
	Tannins and other chemicals	<i>Acacia</i> , <i>Rhamnus</i>
Supporting	Firewood and charcoal	<i>Acacia</i> , <i>Eucalyptus</i> , <i>Pinus</i> , <i>Tamarix</i>
	Medicinal	<i>Acacia</i> , <i>Ulmus</i> , <i>Pinus</i> , <i>Spatholobus</i>
	Not and fruit crops	<i>Pinus</i> , <i>Morus</i>
Regulating	Carbon sequestration	<i>Pinus</i> , <i>Pseudotsuga</i>
	Erosion control, including windbreaks	<i>Acacia</i> , <i>Ulmus</i> , <i>Eucalyptus</i> , <i>Pinus</i> , <i>Rhamnus</i> , <i>Salix</i> , <i>Tamarix</i>
	Land reclamation	<i>Robilia</i> , <i>Tamarix</i>



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### The case for natives

- Adaptedness
- Biodiversity
- Sense of place
- Invasives