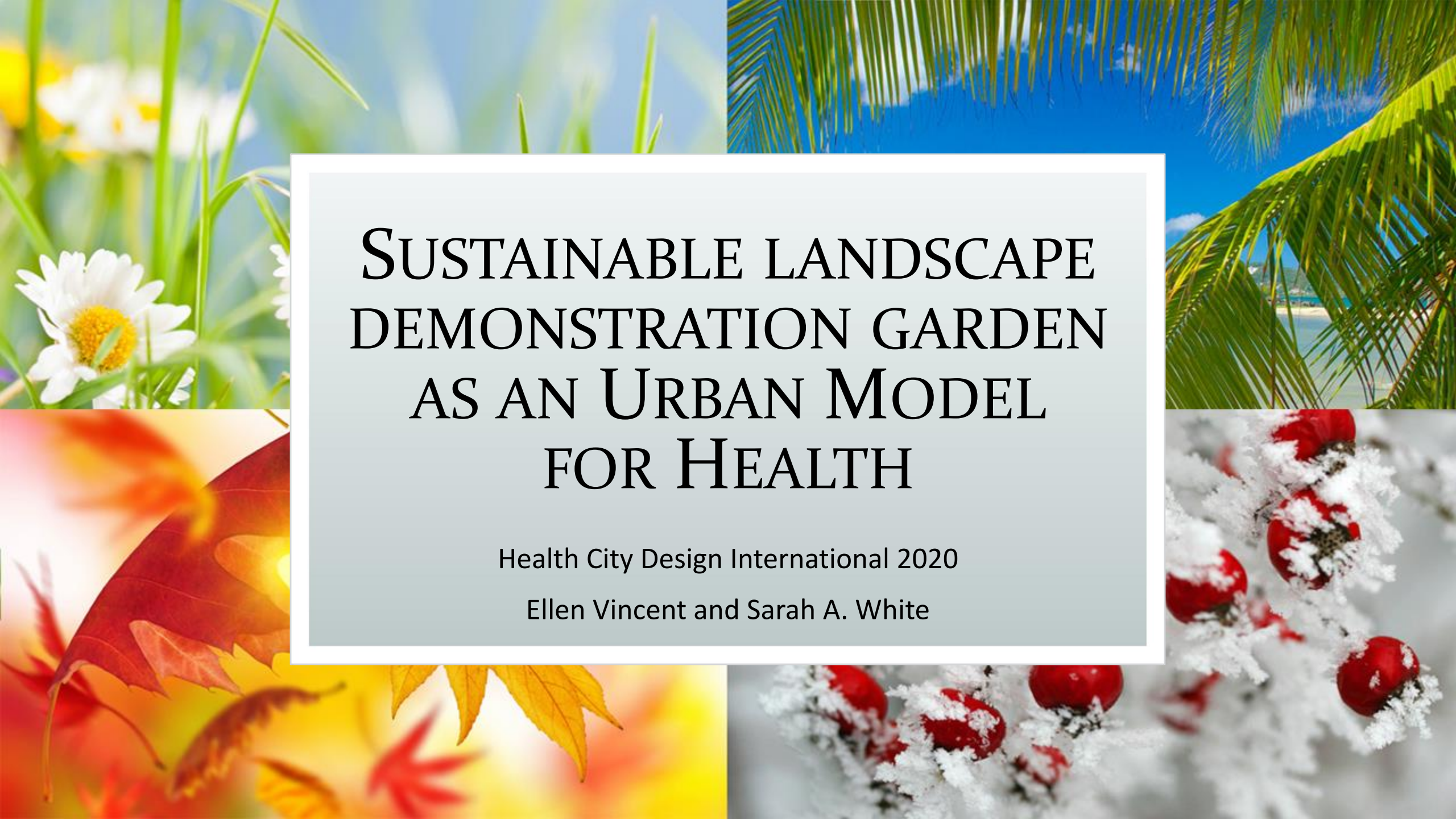


Sustainable landscape demonstration garden as an Urban Model for Health

Health City Design International 2020

Ellen Vincent and Sarah A. White

Purpose

- Create an urban sustainable garden model to promote environmental and human health and well-being.
  - Should be replicable. Web page: http://www.clemson.edu/cafls/demo/index.html

Theory: Appleton's Prospect Refuge Theory

- People have an evolutionary preference for landscapes that provide real or symbolic opportunities for a view of what is around them (prospect) and for safety (refuge) (Appleton, 1996).
  - Web page: http://www.clemson.edu/cafls/demo/index.html

Appleton J. (1996) *The experience of landscape*. Chichester, England: John Wiley & Sons.

Guiding Principles

1) Environmental educational displays are needed in the busiest, hectic urban environments in order to reach and influence greater numbers and diverse people (Hester, 2006)

Photo by B. Anderson

Photo by S. Lombardo

Pre-installation spaces on college campus 1,400 sf (left) 1,800 sf (right)

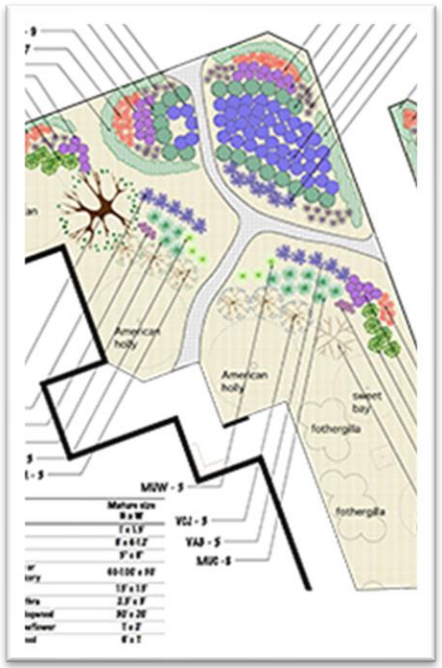
Hester, R. (2006) *Design for ecological democracy*. Cambridge, MA: MIT Press.

Guiding Principles

2) The display should be aesthetically pleasing as well as educational so as to generate sales and production of these less common, but environmentally beneficial plants (Nassauer, 1997)

Designs: Reburn (2011)

Lombardo-Fraser (2011)



White (2012)

Kelly (2012)

Nassauer, J. (1997) Cultural sustainability: Aligning aesthetics and ecology. In *Placing nature: Culture and landscape ecology*. Washington, D.C.: Island Press.

Guiding Principles

3) The experimental nature of the garden should include a participatory role for passersby to share their opinion and judgment of the display. Participation is engaged learning and often results in greater knowledge retention and continued involvement (Hester, 2006).

Photo by E. Vincent

Hester, R. (2006) *Design for ecological democracy*. Cambridge, MA: MIT Press.

Process

- Conduct a competitive design process using native plant selections to provide eco-system services, e.g. habitat and food source for native insects and animals (Tallamy, 2011).
- Install and maintain garden using low-maintenance techniques.
- Study environmental health and human perceptions.

Photo by E. Vincent

6” leaf mold compost tilled to a depth of 8”

Photo by E. Vincent

Girdling roots loosened prior to planting

Tallamy, D. (2011). *Bringing nature home*. Portland, OR: Timber Press.

Process

- Provide on-site and Web educational materials.
- Student workers serve as educational ambassadors.

Photos by E. Vincent

Pre-installation 2011

Photo by B. Anderson

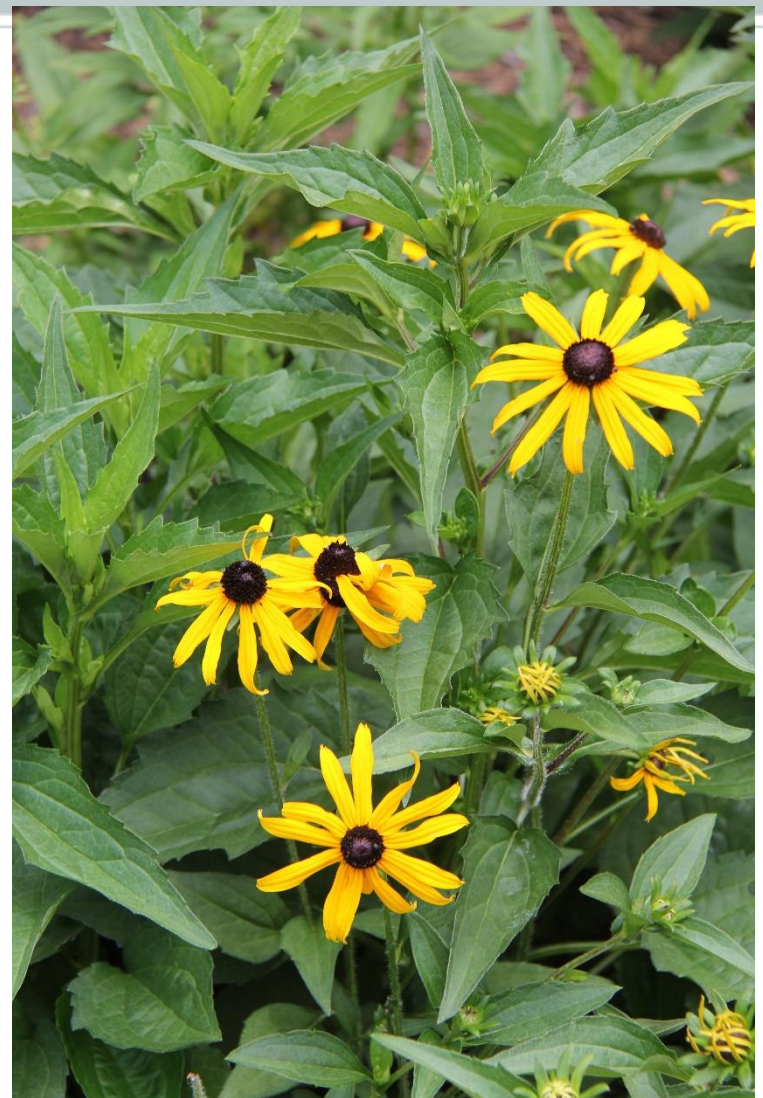
Photo by S. Lombardo

Pre-installation spaces on college campus 1,400 sf (left) 1,800 sf (right)

Hester, R. (2006) *Design for ecological democracy*. Cambridge, MA: MIT Press.

Post installation Summer 2013

Photos by E. Vincent



Rudbeckia 'Goldsturm'

Post installation April 2018

Photos by E. Vincent

Fothergilla gardenii

POST-INSTALLATION LEHOTSKY BED

Purple coneflower

Pink muhly grass

Late purple aster

Autumn swamp sunflower

Photo by Walker Massey

Photo by E. Vincent

Post-installation spaces on college campus 1,800 sf (right)

POST-INSTALLATION CENTER BED

Photo by S.A. White

Photo by Walker Massey

Post-installation spaces on college campus 1,400 sf

Student Workers & Landscape Services Staff

Photos by E. Vincent

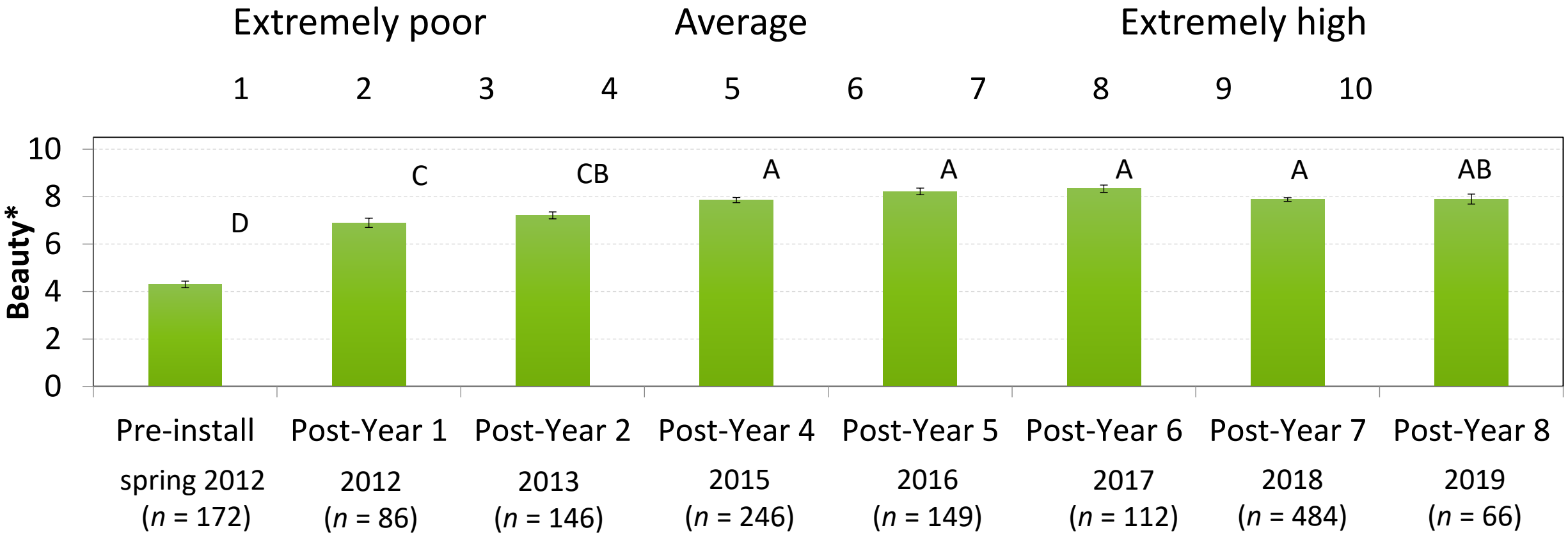
Student Education Ambassadors & Garden Maintenance Workers

Butterflyweed
Asclepias tuberosa

Photos by E. Vincent

Pre & Post installation Survey data

On a scale of 1 to 10, how **aesthetically** pleasing (beautiful) is the landscape to you?

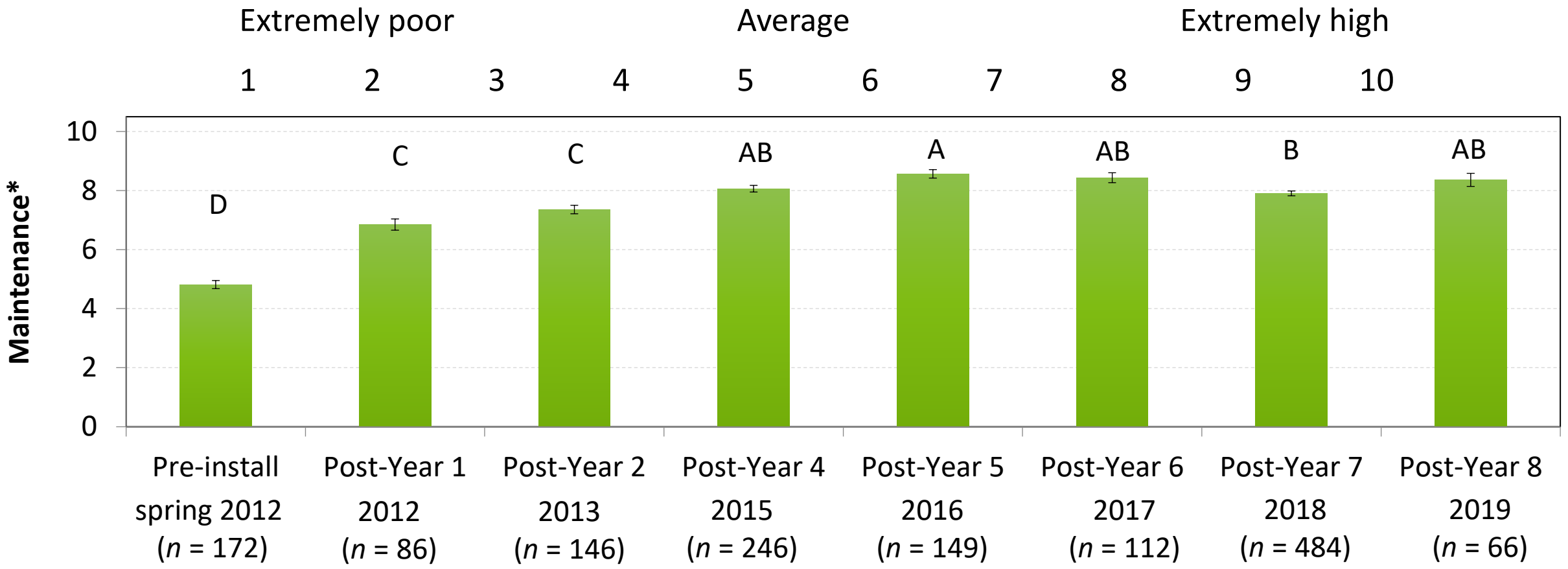


*LS Means Differences Tukey HSD ($P < 0.0001$)

Data analysis by Dr. Sarah White

Pre & Post installation Survey data

On a scale of 1 to 10, how well **maintained** does the landscape here appear to you?

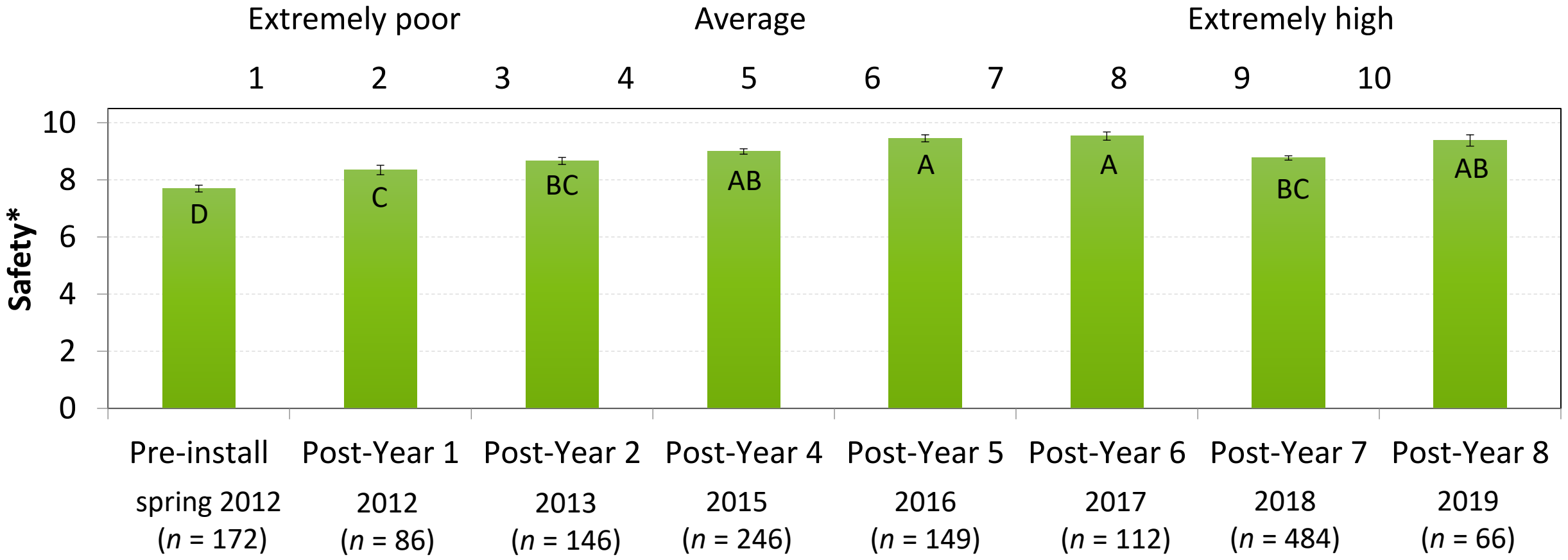


*LS Means Differences Tukey HSD ($P < 0.0001$)

Data analysis by Dr. Sarah White

Pre & Post installation Survey data

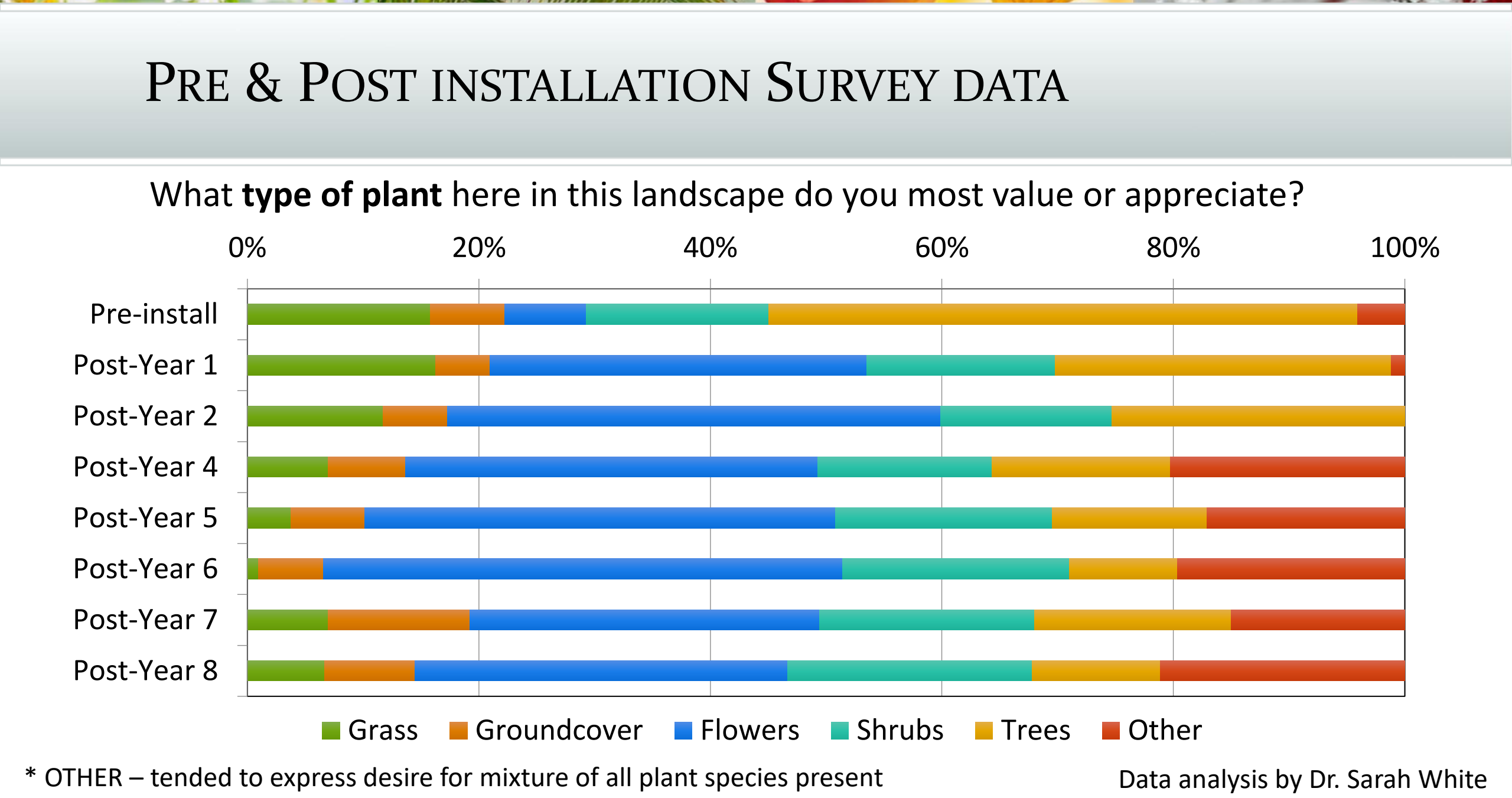
On a scale of 1 to 10, how **safe** do you feel in this landscape space?



*LS Means Differences Tukey HSD ($P < 0.0001$)

Data analysis by Dr. Sarah White

Pre & Post installation Survey data

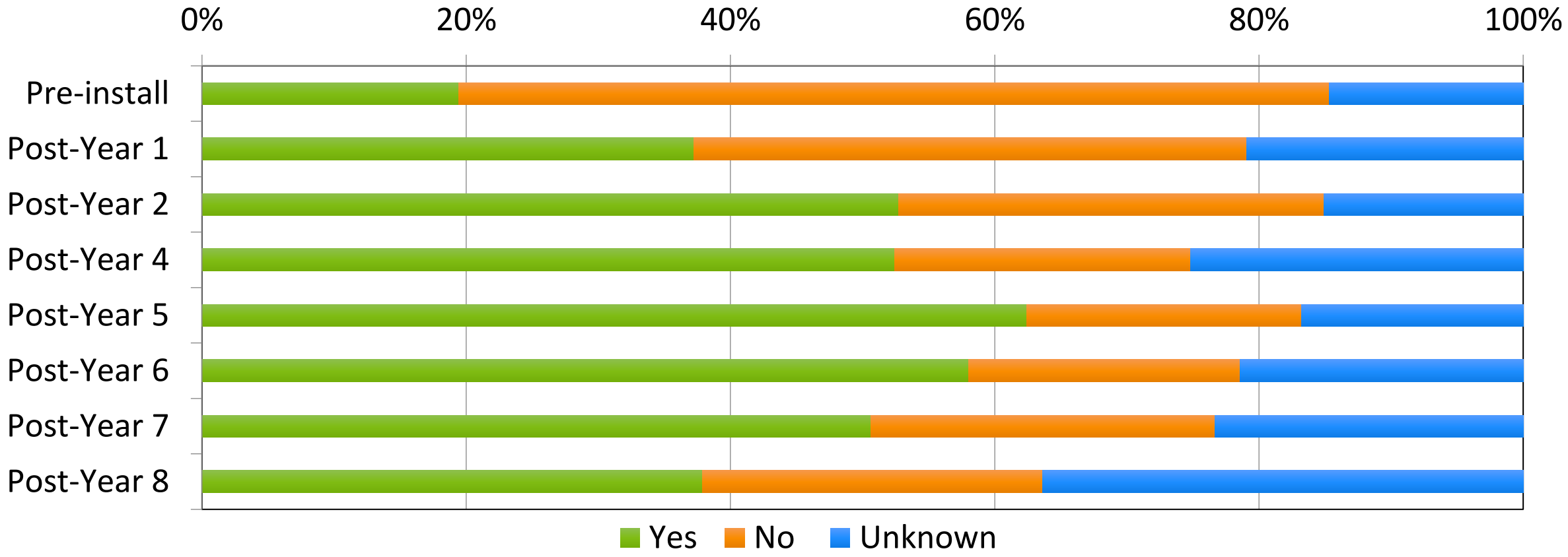


* OTHER – tended to express desire for mixture of all plant species present

Data analysis by Dr. Sarah White

Pre & Post installation Survey data

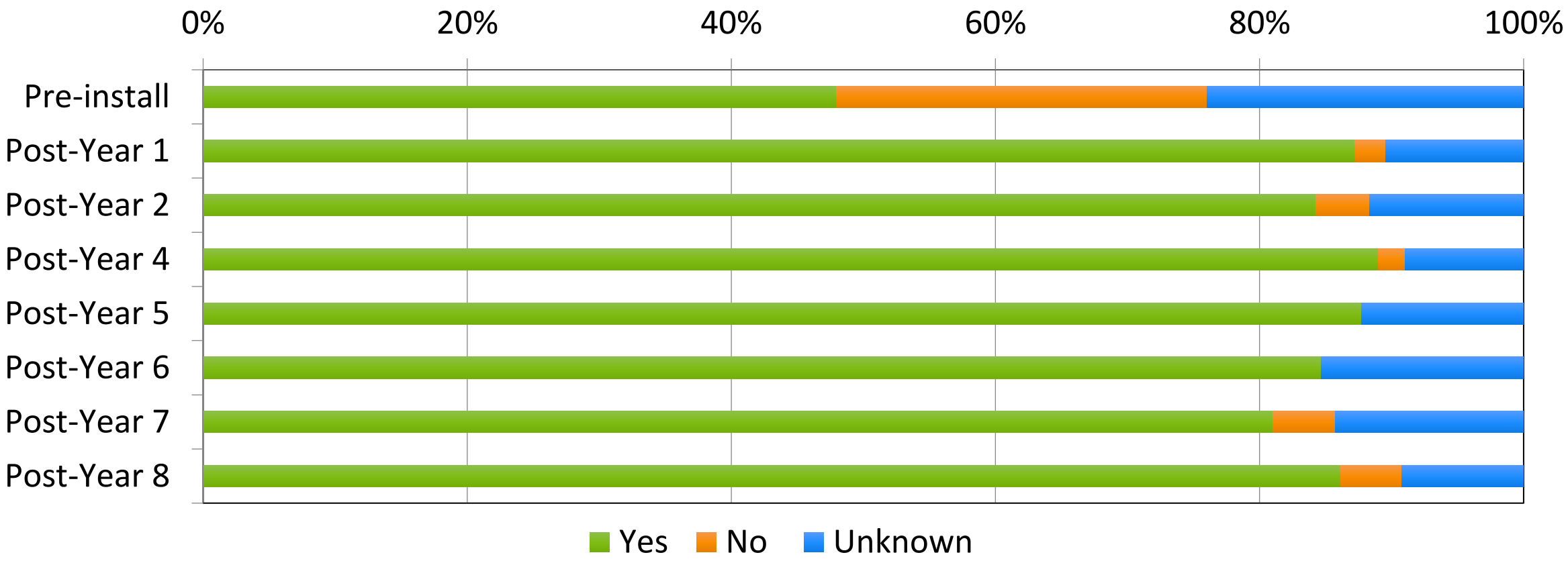
Does this landscape (the demonstration garden) **teach** you anything about soil, plants, or water?



Data analysis by Dr. Sarah White

Pre & Post installation Survey data

Do you think this landscape (demonstration garden) is good for **human health** and well-being?



Post installation 2020

Photos by Carson Colenbaugh 2020

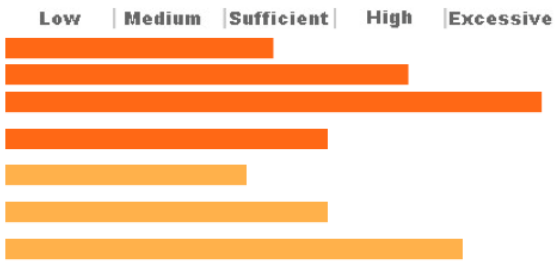
June 2020

Pre & Post soil sample data

- Minimal change between pre & post soil sample data for
  - minerals
  - organic matter
  - CEC suggest
- Depletion of most minerals did not occur while plants establishing

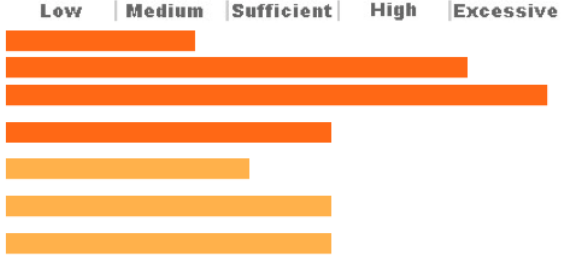
PRE

Analysis	Results	
Soil pH	7.2	
Buffer pH	7.80	
Phosphorus (P)	45	lbs/acre
Potassium (K)	216	lbs/acre
Calcium (Ca)	4981	lbs/acre
Magnesium (Mg)	342	lbs/acre
Zinc (Zn)	10.3	lbs/acre
Manganese (Mn)	81	lbs/acre
Boron (B)	3.3	lbs/acre
Copper (Cu)	0.6	lbs/acre
Sodium (Na)	14	lbs/acre
Sulfur (S)		lbs/acre
Soluble Salts		mmhos/cm
Nitrate Nitrogen		ppm
Organic Matter	5.6	% (LOI)



POST

Analysis	Results	
Soil pH	7.1	
Buffer pH	7.75	
Phosphorus (P)	33	lbs/acre
Potassium (K)	252	lbs/acre
Calcium (Ca)	4085	lbs/acre
Magnesium (Mg)	318	lbs/acre
Zinc (Zn)	8.7	lbs/acre
Manganese (Mn)	116	lbs/acre
Boron (B)	2.9	lbs/acre
Copper (Cu)	1.2	lbs/acre
Sodium (Na)	13	lbs/acre
Sulfur (S)		lbs/acre
Soluble Salts	0.17	mmhos/cm
Nitrate Nitrogen		ppm
Organic Matter	5	% (LOI)



Data analysis by Dr. Dara Park

Plant Popularity (Web Analytics)
Unique web-views July 2013 – December 2019

2013	2014	2015	2016	2017	2018	2019	2020
1294	7681	9620	4825	1581	5733	7413	7842

Total views of Plant Profiles: 45,989

http://www.clemson.edu/cafls/demo/index.html

Data collection by Donna Bowen, data analysis by Sarah White

Plant Popularity (Web Analytics)
Unique web-views July 2013 – December 2019

Photos by Sarah White

Plant Popularity (2013-19)

3

4

5

6

Photos by Sarah White

Plant Popularity (2013-19)

7

8

Photo https://www.degroot-inc.com

Photos by Sarah White

9

10

Plant Popularity – weighted by years evaluated

1

Pinky Muhly Grass
(1,270)

2

Narrow-leaf sunflower
(385)

3

Flowering Dogwood
(369)

4

Fringe Tree
(344)

5

Trumpet Creeper
(344)

6

Butterfly milkweed
(229)

7

Georgia aster
(217)

8

Passion vine
(216)

9

‘Mt. Airy’ Fothergilla
(180)

10

’Misty’ Blueberry
(180)

Garden gratitude

Installation: Clemson Extension Service

Installation/maintenance: Clemson Landscape Services

Research/garden support: Clemson Creative Inquiry & Undergraduate Research

https://www.clemson.edu/centers-institutes/watt/creative-inquiry/

Data analysis/data collection contributions

Sarah White professor & nursery extension specialist
Department of Plant & Environmental Sciences

Donna Bowen, social media & marketing
PSA/CAFLS Communications Team

Instructor contact

Ellen Vincent, Ph.D.
Senior Lecturer, Faculty of Horticulture
Department of Plant and Environmental Sciences
Clemson University
173 Poole Agricultural Center Box 340310
Clemson, SC 29634-0310 USA
ellenav@clemson.edu

Horticulture/Plant & Environmental Sciences

Photo by Mahaffey, Clemson University

ISA Certified Arborist #SO-6460A

CAFLS Certificate of Excellence in Academic Assessment 2019

Critical Thinking CT^2 Faculty Scholar 2014-2019

CAFLS Excellence in Teaching Award 2016

Louis P. Parsons Award for Outstanding Service to Nursery and Landscape Industry 2015