Sustainable Landscape Demonstration Garden

SC Horticulture Industry Conference
Myrtle Beach, South Carolina
January 21, 2016

Katherine Hollifield
Senior, Horticulture Major
Clemson University
The Class

- HORT 408 Horticulture Discovery & Inquiry
- Dr. Ellen Vincent
- 3 Credits

Project Title:
- Sustainable Landscapes: Demonstration Garden
- Creative Inquiry #827
- Garden research and maintenance
Garden Location

http://www.clemson.edu/cafls/demo/about.html
Garden Location

http://www.clemson.edu/cafls/demo/about.html
Two Beds

Area:

• 1400 ft$^2$

• 1800 ft$^2$
Public Garden

- Maintenance
  - Mulching
  - Weeding
  - Watering

- Advice

- Entered data

- Cleanup
Cleanup
Coarse and Fine Mulch
Coarse and Fine Mulch
Garden

2011
• Design

2012
• Installation
Before

1800 ft²

1400 ft²

Courtesy of Dr. Ellen Vincent
During

Courtesy of Dr. Ellen Vincent
• 6” of leaf compost
• Tilled to 8” depth
• Topped off with 3” of mulch
After
Native Plants in the Landscape

What comes to mind?

- Messy
- Too much work
- Beautiful
On a scale of 1 to 10, how aesthetically pleasing (beautiful) is the landscape to you?

Extremely poor | Average | Extremely high
---|---|---
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

On | 0 - Pre-install | 1 - Post-install Y1 | 2 - Post-install Y2
---|---|---|---
spring 2012 (n = 171) | fall 2012 (n = 86) | fall 2013 (n = 162)

Beauty*

- 0 - Pre-install: 4.3
- 1 - Post-install Y1: 6.9
- 2 - Post-install Y2: 7.2

*LS Means Differences Tukey HSD (P < 0.0001)
Now what?

- Passerby surveys conducted
- Data gathered (database)
- Plants added
- Plants removed
CITI Certification in Social and Behavioral Research (SBR)

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Katherine Holtfield (ID:)
- Email: klosey@clemson.edu
- Institution Affiliation: Clemson University (ID):

- Curriculum Group: Human Subjects Protections Course
- Course Learner Group: Group 1 Investigators Conducting Social and Behavioral Science Research (SBR) at Clemson University
- Stage: Stage 1 - Basic Course

- Report ID: 16213229
- Completion Date: 06/03/2015
- Expiration Date: 06/02/2017
- Minimum Passing:
- Reported Score:

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<th>REQUIRED AND ELECTIVE MODULES ONLY</th>
<th>DATE COMPLETED</th>
<th>SCORE</th>
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<tr>
<td>Belmont Report and CITI Course Introduction (ID:1127)</td>
<td>06/03/15</td>
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<td>History and Ethical Principles - SBE (ID:490)</td>
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<td>The Federal Regulations - SBE (ID:502)</td>
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<td>Privacy and Confidentiality - SBE (ID:505)</td>
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For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid independent learner.

CITI Program
Email: ctisupport@miami.edu
Phone: 305-243-7570
Web: https://www.citiprogram.org
Surveys

In-person landscape preference survey  2015

Name:____________________________  Date:  __________  Time:__________  Paper or iPad

Verbal Script:

Hello, my name is __________, and I'm a student in Dr. Vincent's Environmental Horticulture class at Clemson University. I am conducting a survey about landscape preferences and would like to ask you a few questions. The questions will take less than four minutes and the information you provide will only be used in the study and will never be used to identify you personally in any way. Would it be okay to begin with my questions?

Thank you.

(1) Can you please tell me why you are here in this space today?
   a. I am passing through on my way somewhere else.
   b. This place is my destination.
   c. Other: ____________________________

(2) On a scale of 1 to 10, how aesthetically pleasing (beautiful) is the landscape to you?  
   Extremely poor  1  2  3  4  5  6  7  8  9  Extremely high  10  

(3) On a scale of 1 to 10, how well maintained does the landscape appear to you?  
   Extremely poor  1  2  3  4  5  6  7  8  9  Extremely high  10  

(4) On a scale of 1 to 10, how safe do you feel in this landscape space?  
   Extremely unsafe  1  2  3  4  5  6  7  8  9  Extremely safe  10  

(5) What type of plant here in this landscape do you most value or appreciate?  
   a. Turfgrass  
   b. Groundcovers  
   c. Flowers  
   d. Ornamental grass  
   e. Shrubs  
   f. Trees  
   g. Other: ____________________________

(6) Does this landscape or the gardens right here teach you anything about soil, plants, or water?  
   a. Yes  
   b. No  
   c. Unknown

(7) Do you think this landscape or the gardens right here are good for the environment?  
   a. Yes  
   b. No  
   c. Unknown

(8) Do you think this landscape or the gardens right here are good for human health and well-being?  
   a. Yes  
   b. No  
   c. Unknown

(9) If you could add anything to this landscape or garden space to make it better for you what would it be?  
   ____________________________

(10) If you could copy anything that you see or experience herein this landscape to have at your own home what would it be?  
   ____________________________

The following four questions are about you.

(1) Which of the following best describes you?  
   a. Student  
   b. Staff  
   c. Faculty  
   d. Visitor

(2) What is your gender?  
   a. Male  
   b. Female

(3) What is your age group?  
   a. 18-29  
   b. 30-55  
   c. 60 or older

(4) Which college area are you affiliated with?  
   a. College of Agriculture, Forestry & Life Sciences  
   b. College of Architecture, Arts & Humanities  
   c. College of Business & Behavioral Sciences
Now what?

- Passerby surveys conducted
- Data gathered
- Plants added
- Plants removed
Passiflora incarnata: Passion Vine

Image: Kathy Hollifield
Vaccinium
Tissue Analysis
## Deficiency

**Analysis**

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Results</th>
<th>Low</th>
<th>Medium</th>
<th>Sufficient</th>
<th>High</th>
<th>Excessive</th>
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<tbody>
<tr>
<td>Soil pH</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Buffer pH</td>
<td>7.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Phosphorus (P)</td>
<td>31 ppm</td>
<td></td>
<td></td>
<td></td>
<td>Excessive</td>
<td></td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>310 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
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</tr>
<tr>
<td>Calcium (Ca)</td>
<td>6039 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
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<tr>
<td>Magnesium (Mg)</td>
<td>383 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>11.8 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>96 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Boron (B)</td>
<td>2.7 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>0.7 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>13 ppm</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
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<td>Sulfur (S)</td>
<td>16 ppm</td>
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<td>High</td>
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<tr>
<td>Soluble Salts</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Nitrates Nitrogen</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Organic Matter</td>
<td></td>
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</tr>
</tbody>
</table>

**Courtesy of Dr. Ellen Vincent**
Not Applied

- Pesticides
- Fertilizers
Now what?

- Passerby surveys conducted
- Data gathered
- Plants added
- Plants removed
Where can you find out more about the Sustainable Landscape Demonstration Garden?
Sustainable Landscape Demonstration

The Sustainable Landscape Demonstration Garden, located in the McGinty Mall or Agriculture Quad, is the result of a campus-wide collaborative effort that brought together multiple departments within the School of Agricultural, Forest, and Environmental Sciences (SAFES), university landscape services, campus planning, extension, and the SC Botanical Garden. This project was funded by a one-time grant from Public Service and is an example of the creativity and teamwork happening in SAFES and across campus.

We hope the Sustainable Landscape Demonstration Garden will serve as a model for urban organizers and extension agents and that it will become a gathering place and a place of repose for people from across the Clemson University campus.
About the Garden

Sustainable landscapes can serve as a model for educational advancement by demonstrating innovative installation, maintenance, and research strategies that seek to instill sustainable environmental stewardship understanding and skills.

The McGinty Mall demonstration garden is a contemporary urban adaptation of the traditional ornamental landscape plant field trial. The multiple layers of project participants (researchers, students, consumers, and commercial stakeholders) are intended to build environmental stewardship capacity over time. The garden site (between Barre Hall and Lehotsky) is ideally situated for this type of research due to heavy-foot traffic patterns. This pilot site will
The Designs

Rain Garden Design

Native Plant Design
The Team

- Planning Team
- Designers
- Installation & Maintenance (web summary)

http://www.clemson.edu/cafls/demo/
Kathy Hollifield  
Garden Maintenance/Survey Research  
CITI Certified in Human Subjects Behavioral Research  
HORT 408_007 Summer 2015

Kathy is a senior horticulture major at Clemson University. She grew up helping her parents and grandparents care for their flower and vegetable gardens in Ohio. Kathy loves learning as much as she can about plants. She loves nature and finds working with plants to be very soothing. She performed weekly maintenance in the Sustainable Landscape Demonstration Garden such as applying mulch, weeding, trash pickup and watering (only when necessary). She also collected plant tissue and submitted it to a lab for analysis. Kathy enjoyed educating passersby regarding the types of plants in the garden, finding out their garden preferences via anonymous surveys and listening to them describe the joy that the garden brought to their lives. This experience has taught her that caring for a public garden is quite different than caring for a private garden. Kathy works full-time at Greenville Technical College and hopes to bring much of what she has learned at Clemson University to her job.
The Plants

Plant Profiles

- PLANT RATING SHEETS (PDF)
  - *Amsonia tabernaemontana*: Eastern Blue Star
  - *Andropogon glomeratus*: Bushy Bluestem
  - *Asclepias tuberosa*: Butterfly weed
  - *Baptisia australis*: Blue False Indigo

CU > CAFLS > Sustainable Landscape Demonstration > Plant Profiles > Plant Profiles
Sustainable Landscape Garden Demonstration

Plant Rating

- Please answer the following questions by filling in the blanks or circling the best description.
- Please enter a specific, complete plant name in the box.
- Please rate each plant by checking the box where 1 is poor, 3 is average and 5 is excellent.
- Please initial each page and return to Dr. Ellen Vincent (office, email and fax # at bottom of page).

Name: _______________________________ Email: _______________________________

Phone #: _______________________________

Date of viewing/rating (please circle):
2013  2014  2015  2016  2017  2018
Jan  Feb  March  April  May  June  July  Aug  Sept  Oct  Nov  Dec

Gardening Experience (please circle):  No experience  Student  Master Gardener  Professional
Other: _______________________________

<table>
<thead>
<tr>
<th>Plant name:</th>
<th>Poor</th>
<th>Average</th>
<th>Excellent</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloom color</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bloom shape</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foliage color</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foliage habit (behavior)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Plant profile sheets...
**Echinacea laevigata**: Smooth Purple Coneflower

<table>
<thead>
<tr>
<th>Latin name:</th>
<th>Echinacea laevigata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common name:</td>
<td>Smooth Purple Coneflower</td>
</tr>
<tr>
<td>Flowers:</td>
<td>Purple to pink, showy and delicate drooping purple rays. Blooms June to August[^12]</td>
</tr>
<tr>
<td>Fruit:</td>
<td>Not significant[^13]</td>
</tr>
<tr>
<td>Height &amp; Width:</td>
<td>2-5' x 1.5-2'[^12]</td>
</tr>
<tr>
<td>Type:</td>
<td>Herbaceous perennial[^12]</td>
</tr>
<tr>
<td>Habit:</td>
<td>Upright, cascading, mound[^16]</td>
</tr>
<tr>
<td>Wetland indicator category**:</td>
<td>No Wetland indicator was available for this plant.</td>
</tr>
<tr>
<td>Texture:</td>
<td>Fine[^16]</td>
</tr>
<tr>
<td>Growth rate:</td>
<td>Moderate[^12]</td>
</tr>
<tr>
<td>Light:</td>
<td>Full sun to part shade[^12]</td>
</tr>
<tr>
<td>Moisture:</td>
<td>Dry to medium[^12]</td>
</tr>
<tr>
<td>Soil:</td>
<td>Tolerates clay soil, dry soil, shallow and rocky soil[^12]</td>
</tr>
<tr>
<td>Zones:</td>
<td>3-8[^12]</td>
</tr>
<tr>
<td>Origin:</td>
<td>Southeastern United States[^16]</td>
</tr>
</tbody>
</table>

**Note:** This plant is on the United States threatened and endangered species list[^16].

**Features:** Beautiful, purple showy flowers are an attractive addition to a planting bed. The long-blooming flowers provide for longer color interest in the native plant garden. It can grow to be 2 to 5 feet tall, so placement must be made accordingly. Butterflies and other wildlife are attracted to the habitat this plant provides[^12].
**Muhlenbergia capillaris**: White Muhly Grass

- **Latin name**: *Muhlenbergia capillaris*
- **Common name**: White Muhly Grass
- **Flowers**: Showy
- **Fruit**: Not noticeable
- **Height & Width**: 3' x 3'
- **Type**: Perennial ornamental grass
- **Habit**: Upright grass
- **Wetland indicator category**: FACU
- **Texture**: Fine textured basal foliage
- **Growth rate**: Medium
- **Light**: Sun to light shade
- **Moisture**: Very drought tolerant
- **Soil**: Well drained soil does well in hot dry sandy sites
- **Zones**: 6-9
- **Origin**: Western-central United States

**Features**: An airy inflorescence colored creamy white, which dries to a light grey in early November. These grasses have dark green glossy leaves and are excellent winter interest plants. The cultivar White Cloud exhibits the same traits as the pink muhly grass except that it flowers white.

**Siting**: Belongs in well-drained soils because it is very drought tolerant, also does well in sandy soils. Should be planted in mass to create a statement in the landscape, does well in edging and borders as well as centerpieces.

**Care**: Plant in suitable site with adequate soil organic matter so that the crown of the plant is at the soil surface. Ensure soil is well-drained and not waterlogged.
Muhlenbergia capillaris: Pink Muhly Grass

<table>
<thead>
<tr>
<th>Latin name: Muhlenbergia capillaris</th>
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<tbody>
<tr>
<td>Common name: Pink Muhly Grass</td>
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<tr>
<td>Flowers: Showy</td>
</tr>
<tr>
<td>Fruit: Not noticeable</td>
</tr>
<tr>
<td>Height &amp; Width: 3’ x 3’ 12</td>
</tr>
<tr>
<td>Type: Perennial ornamental grass 12</td>
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<tr>
<td>Habit: Upright grass</td>
</tr>
<tr>
<td>Wetland indicator category**: FACU 17</td>
</tr>
<tr>
<td>Texture: Fine textured basal foliage 12</td>
</tr>
<tr>
<td>Growth rate: Medium 12</td>
</tr>
<tr>
<td>Light: Sun to light shade 12</td>
</tr>
<tr>
<td>Moisture: Very drought tolerant 12</td>
</tr>
<tr>
<td>Soil: Well drained soil does well in hot dry sandy sites 4</td>
</tr>
<tr>
<td>Zones: 6-9 12</td>
</tr>
<tr>
<td>Origin: Western-central United States 12</td>
</tr>
</tbody>
</table>

Features: Airy inflorescence often colored pink purplish red, purplish gray dries to a light buff; dark green glossy leaves. Excellent winter interest ornamental grass, flowers remain pink into November 12.

Siting: Belongs in well-drained soils because it is very drought tolerant, also does well in sandy soils. Should be planted in mass to create a statement in the landscape, does well in edging and borders as well as centerpieces 15.

Care: Plant in suitable site with adequate soil organic matter so that the crown of the plant is at the soil surface 16. Ensure...
**Eupatorium maculatum**: Spotted Joe Pye Weed

**Latin name**: *Eupatorium maculatum*

**Common name**: Spotted Joe-Pye Weed

**Flowers**: Flat-topped clusters with 9-15 flowers

**Fruit**: Inconspicuous

**Height & Width**: 5-7’ x 4’

**Type**: Herbaceous perennial

**Habit**: Upright

**Wetland indicator category**: FACW

**Texture**: Medium

**Growth rate**: Medium

**Light**: Sun to part shade

**Moisture**: Wet to moist

**Soil**: Loamy and calcareous soils

**Zones**: 4 - 8

**Origin**: Eastern North America

**Features**: *Eupatorium maculatum* is a tall herbaceous perennial that performs well in moist or wet landscapes. The stems are usually spotted or solid purple and lined with whorls of narrow leaves. Clusters of mauve flower heads attract a number of beneficial pollinators in the late summer to autumn months.

**Siting**: Spotted Joe-Pye Weed performs best in moist to wet soils with sun to part sun conditions.
More Plants In The Garden
Hibiscus coccineus
Rose Mallow
Asclepius tuberosa
Butterfly Weed

Image: Kathy Hollifield
Rudbeckia fulgida var. sulpvantii ‘Goldsturm’
Goldsturm Black-Eyed Susan

Image: Kathy Hollifield
Echinacea purpurea ‘PowWow Wildberry’
Echinacea ‘Cheyenne Spirit’

Wildlife Food Source
Wildlife
Native Plants in the Landscape

What comes to mind?

• Messy?
• Too much work?
• Beautiful?
Acknowledgements

- SCNLA
- Creative Inquiry Program at Clemson University
- Dr. Ellen Vincent
Questions?

Image: Kathy Hollifield