Alternatives to Turfgrass Lawns
Gary Knox
North Florida REC - Quincy

Backstory of Lawns
• Originated in England and maritime western Europe as a symbol of social status
  – Evolved from a “browsed grass pasture” to a non-agricultural area artificially maintained (at great expense) as a trimmed grass sward
  – Affiliated with the "English Landscape Style" popularized by "Capability" Brown and other garden designers

Borde Hill, West Sussex, England, UK

Backstory of Lawns
• Concept spread worldwide in early 19th century
  – Temperate European grasses not suited to climates like Florida, requiring substitute grasses
• Emulated by middle class with emergence of mechanical lawn mowers in middle 19th/early 20th centuries
Functions of a Lawn

- Aesthetics (unifying visual element)
- Recreation
- Walkway
- Groundcover
- Erosion control
- Swale vegetation
- Runoff filtration
- Cool/clean air
- Reduce noise

Environmental Problems/Issues

- If dominating a landscape, a turfgrass lawn
  - Reduces biodiversity (i.e., monoculture over a large area)
  - Provides minimal ecosystem services
- High aesthetic appearance requires high levels of inputs
- Ideal lawn plant
  - Beautiful appearance
  - Suppresses weeds
  - Suitable for foot traffic
  - Pest/disease resistant
  - Low maintenance
    - Requires little or no irrigation, fertilization or mowing/pruning
    - Provides ecosystem services

UF’s Ongoing Search for Better Turfgrasses for Florida Lawns

- New, alternative turfgrasses
- Better turfgrasses through breeding

http://www.ffsp.net/uf-research-turfgrass-breeding-program/
Mulches and hardscapes are turfgrass alternatives but also have limitations

Turfgrass Alternatives

• Other climates:
  – Sedum (creeping types; Sedum spp.)
  – Clover (Trifolium spp.)
  – Thyme, oregano, chamomile, other creeping herbs
  – Creeping jenny (Lysimachia spp.)
  – Moss

Possible Turfgrass Alternatives for Florida

• Sedge (Carex spp.; some native)
• Clover (Trifolium spp.)
• Frogfruit (Phyla nodiflora; native)
• Dichondra (Dichondra repens and others; some native)
• Powderpuff, Mimosa (Mimosa angustifolia; native)
• Partridgeberry (Mitchella repens; native)
• Mondo Grass (Ophiopogon spp.)
• Peacock Spikemoss (Selaginella uncinata)
• Asian jasmine (Trachelospermum asiaticum) and other creeping vines
• Wildflowers/meadow (some native)
• Groundcover examples:
  – Daffodil (Narcissus spp.)
  – Liriope (Liriope spp.)
  – Blue-eyed Grass (Sisyrinchium spp.)
  – Juniper (Juniperus spp.)
  – Rose (Rosa spp.)
  – Croton (Zamia pumila)
  – Viola (Viola spp.)
• Pinto peanut (Arachis pintoi)
• Rhizoma perennial peanut (Arachis glabrata)
What are the definitions of “lawn” and “groundcover”?

- Groundcover (botany): dense low herbaceous plants and shrubs that grow over the surface of the ground preventing soil erosion or stifling weeds
- Lawn (horticulture): a flat and usually level area of mown and cultivated grass
- Source: www.thefreedictionary.com

What’s the difference between a “lawn” and a “groundcover”?

- Depends on functional needs and personal opinion
- Typically, “groundcover” beds are not intended for foot traffic

Most turfgrass alternatives have problems of their own

- Limited availability & high cost
- Lack of research on nursery production, lawn establishment, environmental impacts
- Unknown management practices (irrigation, fertilizer, pests/diseases)

Most would not be well-suited for foot traffic (recreation), erosion control, water filtration or for swales
Groundcovers as Alternatives to Turfgrass Lawns

• Typically with dense growth
  – Low growing shrubs
  – Groundcovers
  – Perennials
  – Wildflowers

Rose (Rosa spp.; groundcover types)

Coontie (Zamia pumila)
Wildflower Meadow
• Goldenmane Tickseed (*Coreopsis basalis*) shown in photo
• http://edis.ifas.ufl.edu/topic_wildflowers

Asian Jasmine (*Trachelospermum asiaticum*)

Lawn-like Alternatives to Turfgrass Lawns
• Low-growing, often rhizomatous, stoloniferous or self-rooting:
  – Low growing shrubs
  – Groundcovers
  – Perennials
Juniper (Juniperus spp.; low-growing species and cultivars)

Partridgeberry (Mitchella repens)

Viola (Viola spp.)
Peacock Spikemoss (*Selaginella uncinata*)

- N-C-S FL
- 3-8 inches
- Shade to part shade
- Spreads by rhizomes
- Liliaceae

Mondo Grass (*Ophiopogon* spp.)

- Dark green, grass-like foliage
- Extremely slow to fill beds
- Best for shady areas under trees
- Best unmowed; may be mowed at 3-5 inches but tips turn brown

- Any soil
- Spreads by rhizomes
- Liliaceae
Mondo Grass (Ophiopogon spp.)

- ‘Nana’ grows only 2-3 inches tall

Dichondra (Dichondra repens and D. carolinensis (native))

- N-C-S FL
- 2-3 inches
- Full sun (to part shade)
- Establish from seeds or plugs
- Spreads by stolons
- May be mowed at ½-1 inch every 2 weeks
- Prefers well-drained soil
- Requires N fertilizer

Dichondra (Dichondra repens and D. carolinensis (native))

- Deciduous below 25°F
- Often has weeds
- Low tolerances to salt, drought and foot traffic
- Morning-glory family
**Frogfruit or Matchweed** *(Phyla nodiflora)*

- N-C-S FL (native)
- Height: 3-6 inches
- Spreads by stolons
- Sun (to part sun)
- Adaptable to almost any soil type and drainage
- No mowing needed
- Drought/flood tolerant

**Frogfruit or Matchweed** *(Phyla nodiflora)*

- White flowers in spring & summer attractive to pollinators
- Evergreen in frost-free areas
- Native to southern North America and into the tropics
- Verbenaceae
- Research at Texas A&M and Lady Bird Johnson Wildflower Center

**Powderpuff, Mimosa** *(Mimosa strigillosa)*

- N-C-S FL Native
- 3-4 inches (up to 12)
- Full to part sun
- Any soil
- Spreads by rhizomes
- Mow only once/year
- Tolerant of moderate foot traffic
- Drought and salt tolerant
- Flowers spring & summer
Powderpuff, Mimosa
(Mimosa strigillosa)

- “Sensitive Plant”
- Nitrogen-fixing legume
- Attracts butterflies
- Slow to establish from plants or seeds
- Aggressive yet weeds can establish within beds
- Deciduous below 25°F
- [http://gardeningsolutions.ifas.ufl.edu/giam/plants_and_grasses/grasses_lawn_care/powderpuff_mimosa.html](http://gardeningsolutions.ifas.ufl.edu/giam/plants_and_grasses/grasses_lawn_care/powderpuff_mimosa.html)

Peanut – *Arachis* spp.

- 80 species native to South America
  - Edible peanut or groundnut
    - *Arachis hypogaea*
  - Rhizoma per. peanut
    - *Arachis glabrata*
  - Pinto peanut
    - *Arachis pintoi*
  - Others?

Pinto peanut

- *Arachis pintoi*
- Acid to neutral soils
- Full sun to part shade
- Drought tolerant
- Heat tolerant
- Tolerant of seasonal wet soils
- Free-flowering
- NOT tolerant of cold; Zones 9-10 only
Pinto peanut

- Nitrogen-fixing legume
- Low fertility needs
- Produces many stolons (above-ground runners)
- Cuttings root easily
- Re-seeds freely
- Fast-spreading

Rhizoma Perennial Peanut (Arachis glabrata)

- Evergreen in USDA Hardiness Zones 9-10; perennial in Zone 8
- Soil adaptability:
  - Well-drained soils best
  - pH 5.0-7.5
- Nitrogen-fixing legume
- Full sun to part shade
- Drought/heat tolerant, pest/disease resistant, low input; slight salt tolerance

Pinto Peanut - Panama
Rhizoma Perennial Peanut
(*Arachis glabrata*)

- Evergreen perennial in central and south Florida (USDA Hardiness Zones 9-10)
- Acts as an herbaceous perennial in north Florida and southern portions of the Gulf States (Zone 8)
  - Freeze/frost kills the top
  - Regrows from rhizomes and crowns once warm weather resumes

Rhizoma Perennial Peanut
(*Arachis glabrata*)

- Drought tolerant:
  - Extensive system of rhizomes (below-ground runners) and roots
- Low fertility needs
  - RPP is a legume that can "fix" nitrogen
  - Symbiotic relationship with *Rhizobium* bacteria

Nodules for N Fixation
Rhizoma Perennial Peanut  
(*Arachis glabrata*)

- Ornamental types grow to heights of 3 - 8+ in.
- Yellow flowers throughout the growing season
- Establish by sod, plugs or sprigs
- Does not produce pods of peanuts
- [http://edis.ifas.ufl.edu/ep135](http://edis.ifas.ufl.edu/ep135)

Compared to Rhizoma perennial peanut, Pinto peanut is:

- Lower growing
- More shade tolerant
- Easy to propagate
- Faster coverage
- More flowers
- Less cold tolerant
- Less persistent in north Florida and the Gulf Coast states
- More susceptible to spider mites and nematodes
- Lighter green color
- Less salt tolerant

Rhizoma Perennial Peanut  
(*Arachis glabrata*)

- Which cultivars are best?
  - For:
    - Growth rate
    - Density/filling in
    - Appearance
    - Flowering
- Is RPP adapted to shade?
- Does RPP need to be mowed?
  - If yes, what height?
  - If yes, what frequency?
Exploring New Ornamental Uses for Rhizoma Perennial Peanut
Gary Knox, Ann Blount & Cheryl Mackowiak

North Florida Research and Education Center - Quincy

Traditional Uses for Rhizoma perennial peanut (RPP)

- Widely studied as a forage
  - High value forage for the lower South: “the Alfalfa of the South”
  - Introduced from South America to Florida in 1936
  - Breeding and selection as a forage
    - Tall-growing types producing lots of biomass

Background Information

- Less is known about RPP use in the landscape
- Dwarf or short forms of RPP were long overlooked by forage breeders
- New appreciation of shorter types as a groundcover or lawngrass alternative
  - ‘Ecoturf’: groundcover type released by UF/IFAS in 1992
  - Selections of new short types underway
Rhizoma Perennial Peanut *(Arachis glabrata)*

- Which cultivars are best?
  - For:
    - Growth rate
    - Density/filling in
    - Appearance
    - Flowering
- Is RPP adapted to shade?
- Does RPP need to be mowed?
  - If yes, what height?
  - If yes, what frequency?

Ornamental Groundcover Characteristics of Rhizoma Peanut *(Arachis glabrata Benth.)* in Sun and Shade

Benjamin Anderson, Gary Knox, Ann Blount, Cheryl Mackowiak and Ed Gilman

Research

- Field study comparing 16 selections of rhizoma peanut in sun and shade
  - 2 locations in Florida over 2 growing seasons
Ornamental Research – Field Study

• Compare previously released and new experimental selections
• Compare full sun vs. 30% shade
• Factors:
  – Rate and duration of full canopy cover
  – Height
  – Number of flowers produced
  – Duration of acceptable visual quality
• Recommend selections with the greatest chance for success in ornamental situations

Imposing shade on plots…

• Height (lower heights are desired)
  – Cultivar or selection determines height
  – Shaded plots grew taller and had less uniform canopy than those in full sun

• Flowering
  – Flowering is greater in full sun
  – Taller canopies obscured flowers

Conclusions
Conclusions

• Cover
  – Narrow leaf types performed poorly
  – Rapid and dense cover achieved in both sun and shade
• Appearance
  – Except for flowering, RP performs equally well in full sun and under shade
  – Lower visual quality for forage types

Recommendations – Overall

• Greatest potential
  – Apalachee (unreleased)
    • Cover, flowering and visual quality
  – Chico (unreleased)
    • Height, cover, flowering and visual quality
• Some potential
  – Cowboy
    • Flowering
  – ‘Brooksville 67’ (Waxy)
    • Height and cover
  – ‘Brooksville 68’ (Pointed)
    • Flowering

Apalachee
Mowing Height Affects Landscape Performance of Rhizoma Perennial Peanut
James H. Aldrich, Gary W. Knox, Ann R. Blount and Cheryl L. Mackowiak

Rhizoma Peanut: Mowing Study
- Mowing may be necessary to use RP as a "lawn"
- Overall goal: to determine if RP can perform functionally and aesthetically as a mowed lawn
Materials and Methods

- Mowing treatments on Brooksville 67 (Waxy), Brooksville 68 (Pointed) and Apalachee:
  - Not mowed
  - Mowed at 2 inches every 4 weeks
  - Mowed at 3½ inches every 4 weeks
- Plots evaluated for:
  - Visual quality
  - Number of flowers per square meter
  - Percent bare ground
  - Height

Mowing Plots

Brooksville 67 (Waxy):
Prior to mowing June 29

Non-Mowed Mowed 2” Mowed 3 ½”
Brooksville 68 (Pointed): Prior to mowing June 29

<table>
<thead>
<tr>
<th>Non-Mowed</th>
<th>Mowed 2”</th>
<th>Mowed 3 1/2”</th>
</tr>
</thead>
</table>

Apalachee: Prior to mowing June 29

<table>
<thead>
<tr>
<th>Non-Mowed</th>
<th>Mowed 2”</th>
<th>Mowed 3 1/2”</th>
</tr>
</thead>
</table>

Conclusions

- Based on mowing Apalachee, “Pointed” and “Waxy” at 2- and 3½-inch heights vs. un-mowed
  - Mowing at 2” every 4 weeks often resulted in visible soil surface (i.e. “scalping” and reduced coverage)
  - These RPs were acceptable turf replacements when mowed at 3½” (i.e. same as St. Augustinegrass)
**Future Work**

- Other mowing frequencies
- Management practices
  - Herbicides
  - Disease control
- Longer studies
- Additional locations
- Additional soil types

**Plant Blends for Lawns**

- Mixtures of plants to complement performance and reduce individual limitations

**Wildflower Meadow**

- Goldenmane Tickseed (*Coreopsis basalis*) shown in photo
- [http://edis.ifas.ufl.edu/topic_wildflowers](http://edis.ifas.ufl.edu/topic_wildflowers)
Rhizoma Peanut and Turfgrass

Plant Blends for Lawns

- Mixtures of plants to:
  - complement performance
  - compensate for individual limitations

  - Meadows
  - Turfgrass/dicot blends
    - Wildflowers
    - Clovers
  - Little research

Turfgrass/Rhizoma Peanut Blends

- Research at UF/IFAS NFREC by Mackowiak, Blount, Shober and Minogue
- Key issues:
  - Clone selection of turf and rhizoma peanut
  - Initial proportion of turf vs. rhizoma peanut
  - Management
Possible Turfgrass Alternatives for Florida: Limitations

- Most turfgrass alternatives have problems of their own
  - Limited availability & high cost
  - Lack of research on nursery production, lawn establishment, environmental impacts
  - Unknown management practices (irrigation, fertilizer, pests/diseases)
- Most would not be well-suited for foot traffic (recreation), erosion control, water filtration or for swales

Future?

- Very promising!
- Success can come from personal efforts and collective sharing of experiences