



Alternatives to Turfgrass Lawns

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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 strigillosa*; 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:
 - Daylily (*Hemerocallis* spp.)
 - Liriope (*Liriope* spp.)
 - Blue-eyed Grass (*Sisyrinchium* spp.)
 - Juniper (*Juniperus* spp.)
 - Rose (*Rosa* spp.)
 - Coontie (*Zamia pumila*)
 - Viola (*Viola* spp.)
- Pinto peanut (*Arachis pintoii*)
- Rhizoma perennial peanut (*Arachis glabrata*)



Turfgrass Alternatives

- 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



Turfgrass Alternatives

- 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



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



Groundcovers as Alternatives to Turfgrass Lawns

- Typically with dense growth
 - Low growing shrubs
 - Groundcovers
 - Perennials
 - Wildflowers



Rose (*Rosa* spp.; groundcover types)



Coontie (*Zamia pumila*)



Daylily (*Hemerocallis* spp.)



Liriope (*Liriope* spp.)



Blue-eyed Grass (*Sisyrinchium* spp.)



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)



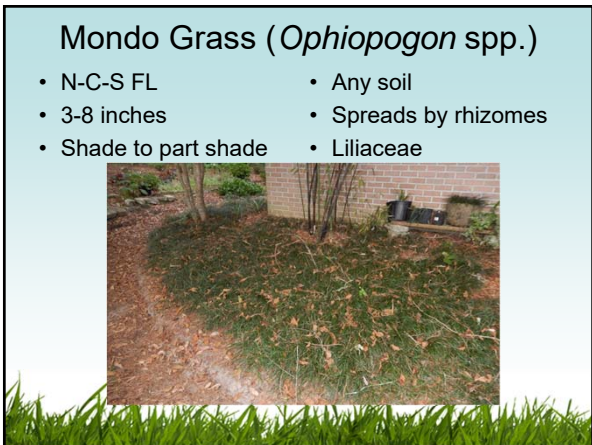
Partridgeberry (*Mitchella repens*)



Viola (*Viola* spp.)









Mondo Grass (*Ophiopogon* spp.)

- 'Nana' grows only 2-3 inches tall
- http://hort.ifas.ufl.edu/database/documents/pdf/shrub_fact_sheets/ophjapa.pdf



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
- UC Extension:
<http://www.ipm.ucdavis.edu/TOOLS/TURF/TURFSPECIES/dichondra.html>





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://gardeningolutions.ifas.ufl.edu/giam/plants_and_grasses/grasses_lawn_care/powderpuff_mimosa.html




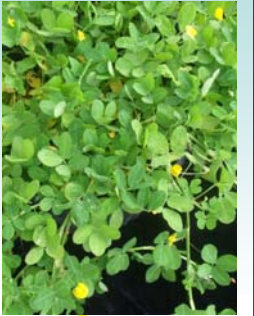
Peanut – *Arachis* spp.

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



Pinto peanut

- *Arachis pinto*
- 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



Pinto Peanut - Panama





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





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



Rhizoma Perennial Peanut (*Arachis glabrata*)




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>



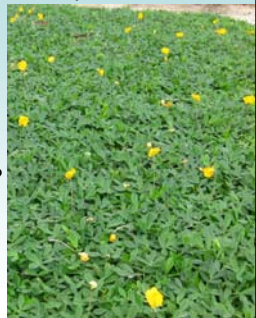
Compared to Rhizoma perennial peanut, Pinto peanut is:

- 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*)**

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 - Density/filling in
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**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...



Conclusions

- 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

- 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



Chico



Cowboy



Waxy (Brooksville 67)



Pointed (Brooksville 68)





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



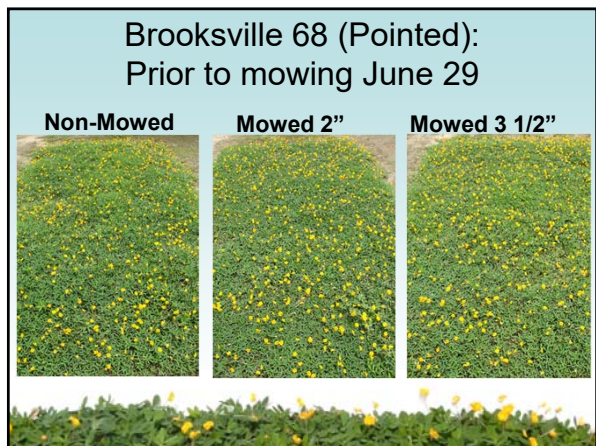
Mowing Plots

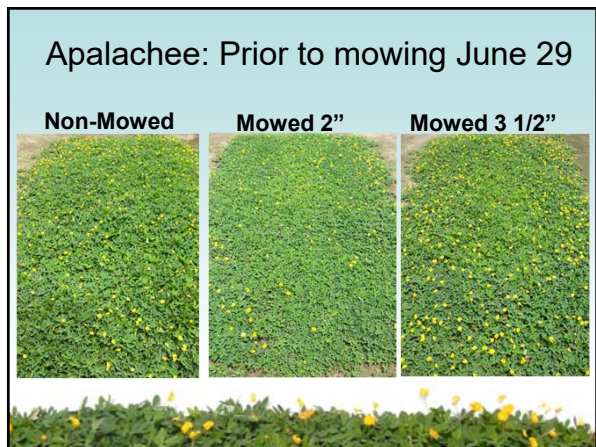


Brooksville 67 (Waxy): Prior to mowing June 29

Non-Mowed Mowed 2" Mowed 3 1/2"









Conclusions

- Based on mowing Apalachee, "Pointed" and "Waxy" at 2- and 3 1/2-inch heights vs. un-mowed



Apalachee

- 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 3 1/2" (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



Matchweed and Turfgrass



Mimosa and Turfgrass



Mimosa and Rhizoma Peanut



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, Shoher and Minogue
- Key issues:
 - Clone selection of turf and rhizoma peanut
 - Initial proportion of turf vs. rhizoma peanut
 - Management

Study on low-gassing turf varieties to reduce roadside mowing, use of fertilizers, and improve erosion control on slopes. (Final report, December 29th, 2013)



Principal Investigator: Cheryl Mackowiak, Soil Nitrogen Management and Water Quality, UFREC, Gaines, FL.
 Co-principal Investigators: Ann Blount, Forage Breeding and Genetics, NFREC, Midway, FL.
 Co-principal Investigators: Josh Shoher, Urban Land Management, UFREC, Midway, FL.
 Co-principal Investigator: Patrick Manganer, Weed Management and Forest Phytology, UFREC, Gaines, FL.

Reprinted in partial fulfillment of Florida Department of Transportation Contract 12R0001100.

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Future?

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