



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

BY ROYAL WARRANT MAKERS TO H.M. THE KING.

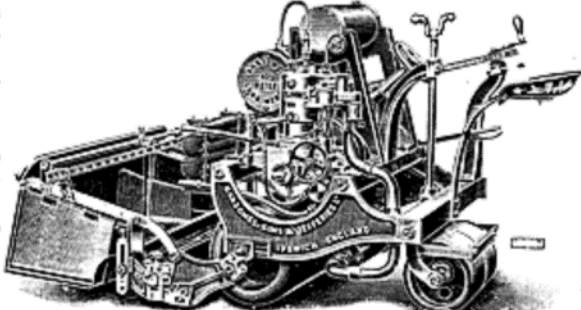
RANSOMES' MOTOR LAWN MOWERS.

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Royal Botanic Society, 1904 and 1905, Gold Medals.

R.A.S.E., London, 1904, Silver Medal.

Made in three sizes. 24 in., 30 in., and 42 in. wide.



Very simple and easy to Manage.

No Coils or Batteries Employed for Ignition.

Every Facility offered for Trial.

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HAND POWER and HORSE and PONY MACHINES. In all sizes to suit every requirement.

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Functions of a Lawn



Environmental Problems/Issues

- If dominating a landscape, a 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



UF's Ongoing Search for Better Turfgrasses for Florida Lawns

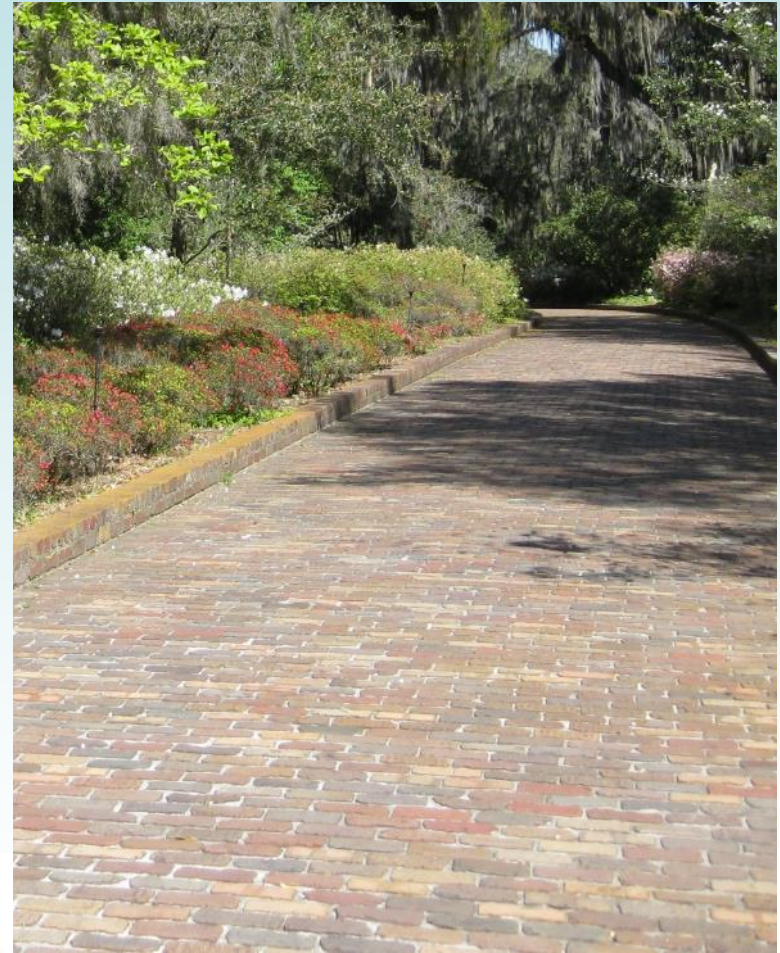
- New, alternative turfgrasses
- Better turfgrasses through breeding



- <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



Sedum (*Sedum acre*) and white clover (*Trifolium repens*) in Maryland USA

[Sedum and clover by Susan Harris; CC 2.0;
[http://farm3.staticflickr.com/2637/3881882126_cf628955d
a.jpg](http://farm3.staticflickr.com/2637/3881882126_cf628955da.jpg)]



Thyme (*Thymus* spp.) and Creeping jenny (*Lysimachia* spp.) in Maryland, USA



Front ex-lawn by
Susan Harris; CC
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<https://www.flickr.com/photos/11525626@N00/3872954610/in/photostream/>



Moss in Kyoto, Japan



Moss garden at
Tōfuku-ji,
Kyōto, Japan by
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[http://en.wike
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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.)
 - Virginia Sweetspire (*Itea virginica*)
 - Rose (*Rosa* spp.)
 - Darrow's Blueberry (*Vaccinium darrowii*)
 - Coontie (*Zamia pumila*)
 - Viola (*Viola* spp.)
- 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, management practices (irrigation, fertilizer, pests/diseases), environmental impacts
 - Few opportunities for funding research
- 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



Darrow's Blueberry (*Vaccinium darrowii*)



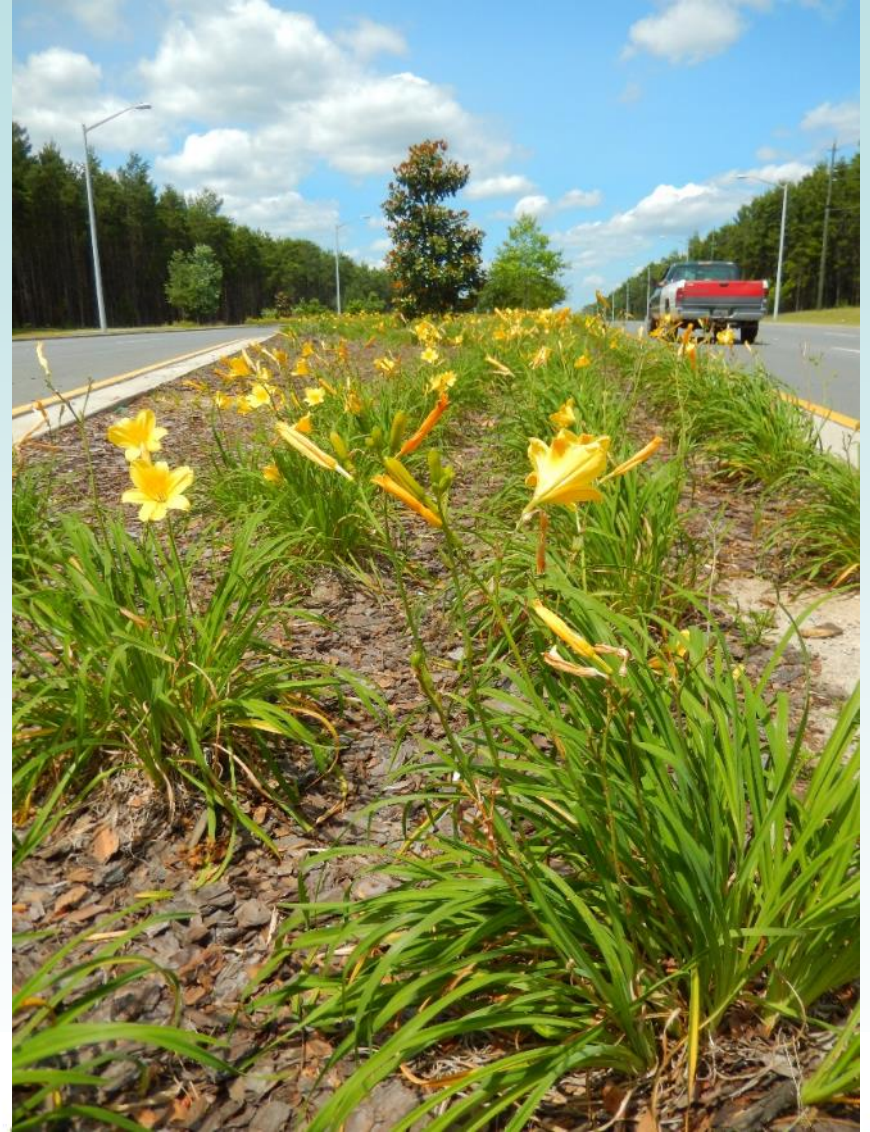
Rose (*Rosa* spp.; groundcover types)



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



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*)



Peacock Spikemoss (*Selaginella uncinata*)



Mondo Grass (*Ophiopogon* spp.)

- N-C-S FL
- 3-8 inches
- Shade to part shade
- Any soil
- 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



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



Frogfruit or Matchweed (*Phyla nodiflora*)

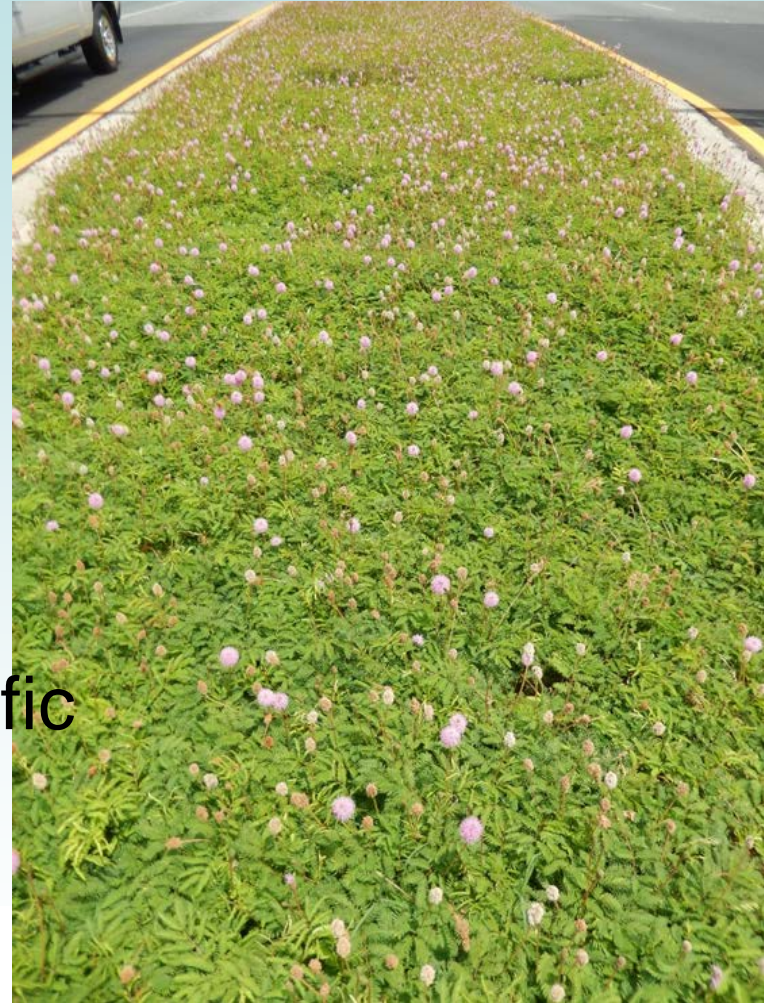
- Adaptable to almost any soil type and drainage
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Photo by S. P. Turnipseed

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/gi/am/plants_and_grasses/grasses_lawn_care/powderpuff_mimosa.html



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



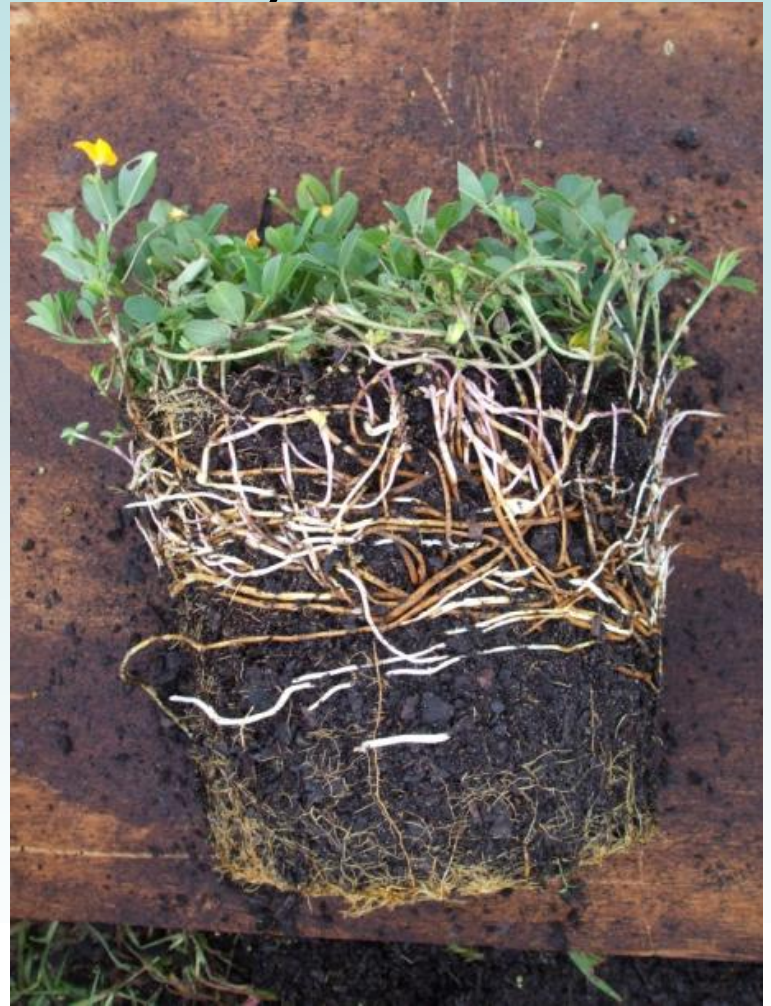
Rhizoma Perennial Peanut (*Arachis glabrata*)

- 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



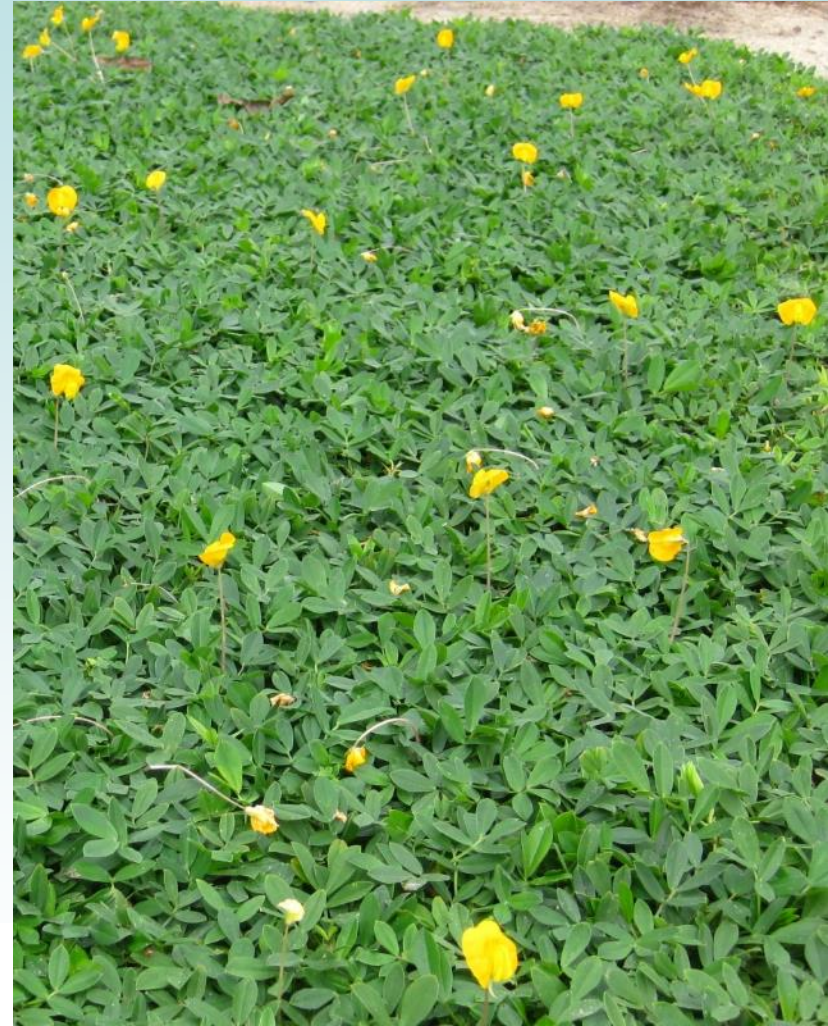
Rhizoma Perennial Peanut (*Arachis glabrata*)

- 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>



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



Peanut – *Arachis* spp.

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



Pinto Peanut - Panama



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



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



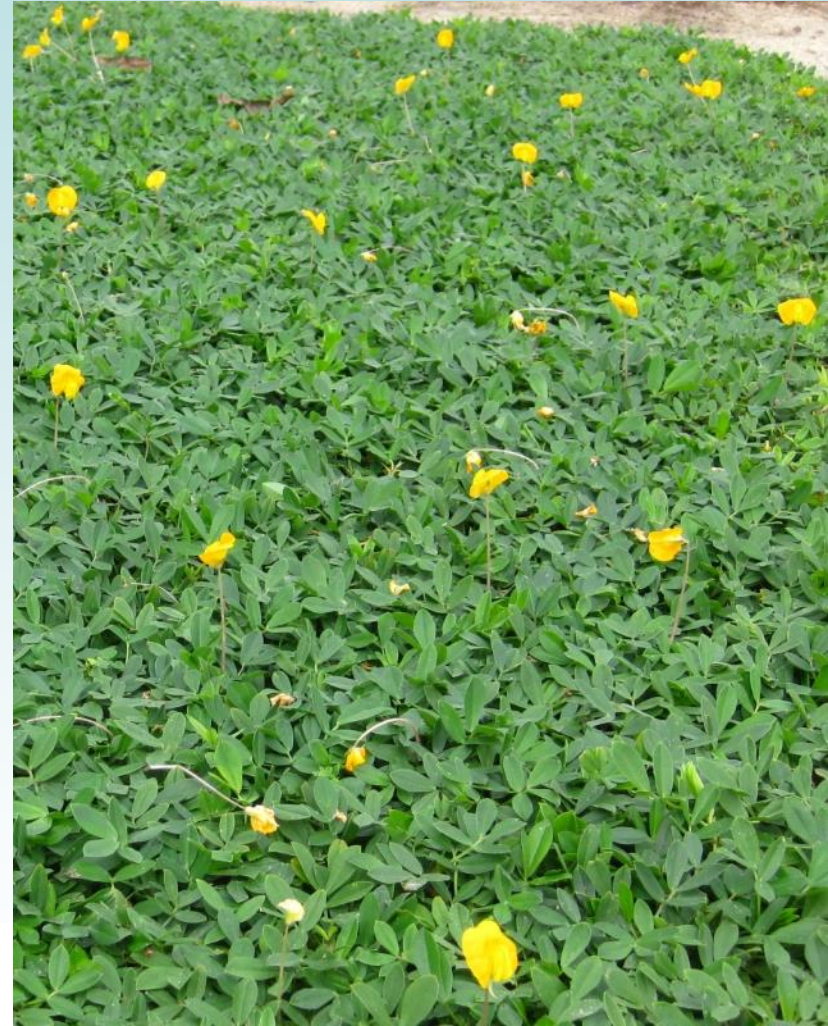
Background Information

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



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

UF | UNIVERSITY of
FLORIDA

Research

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



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
 - Based on cover alone, rhizoma peanut can be successfully grown in shade, as there was no difference in the rate and duration of full cover
- Appearance
 - Except for flowering, RP performs equally well in full sun and under shade
 - Foliar diseases reduced visual quality of susceptible selections
 - 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: Ornamental Uses

- Mowing may be necessary to use RPP as a "lawn"
- Improved flowering has been reported after grazing, harvesting or mowing
- Overall goal: to determine if RPP can perform functionally and aesthetically as a mowed lawn as well as an ornamental groundcover
 - Objectives of this study were to evaluate mowed and non-mowed plots of three RPP selections for visual quality, flowering, percent bare ground and mean plant height



Materials and Methods

- Mowing began 5 May 2011:
 - Not mowed
 - Mowed at 2 inches
 - Mowed at 3½ inches
- John Deere 42” (1.65 m) rotary mower with vacuum system
- Mowed every 28 days (4 weeks)
- Plots were evaluated 0, 1, 14 and 28 days after mowing for:
 - Visual quality (1-5, 5=excellent)
 - 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"



Brooksville 68 (Pointed): Prior to mowing June 29

Non-Mowed



Mowed 2"



Mowed 3 1/2"



Apalachee: Prior to mowing June 29

Non-Mowed



Mowed 2"



Mowed 3 1/2"



Conclusions

- Based on mowing Apalachee, “Pointed” and “Waxy” at 2- and 4-inch heights vs. un-mowed



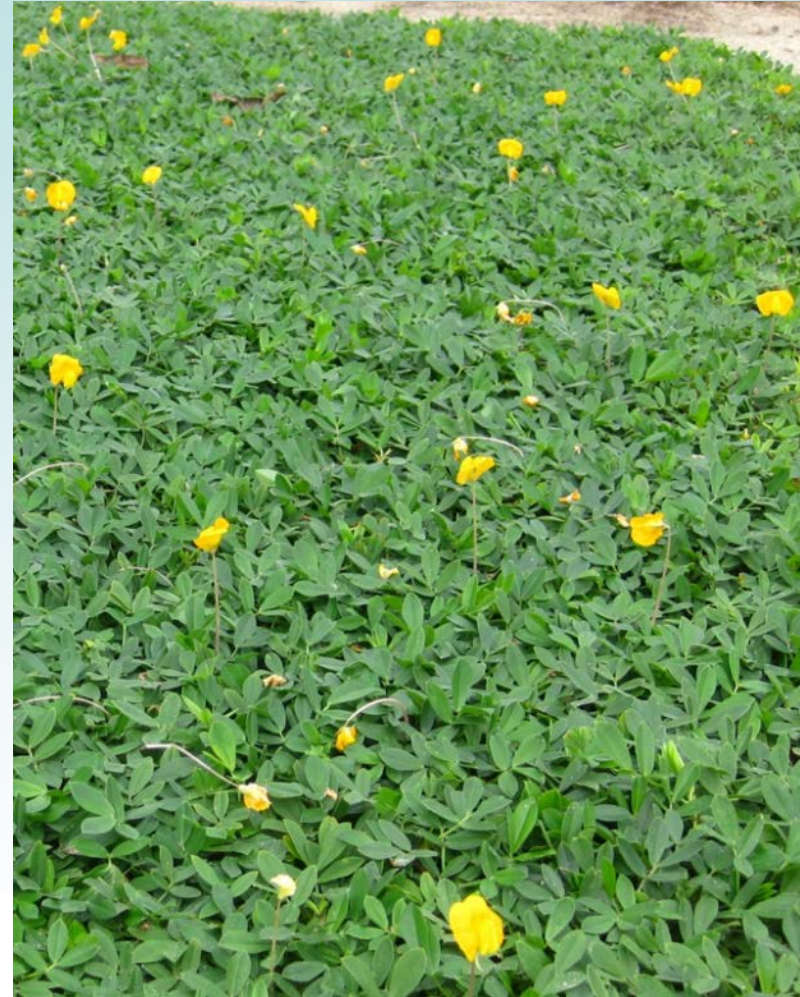
Apalachee

- 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 3½" (i.e. same as St. Augustinegrass)
- Mowing suppressed damage from pepper spot (*Leptosphaerulina crassiasca*)



Future Work

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



Possible Turfgrass Alternatives for Florida: Limitations

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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



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 RPP
 - Initial proportion of turf vs. RPP
 - Management

Study on low-growing Turf Varieties to Reduce Roadside Mowing, Use of Fertilizer, and Improve Erosion Control on Slopes
(Final report, December 20th, 2013)



Principle Investigator: Cheryl Mackowiak, Soil Nutrient Management and Water Quality, NFREC, Quincy, FL.
Co-principle Investigator: Ann Blount, Forage Breeding and Genetics, NFREC, Marianna, FL.
Co-principle Investigator: Amy Shoher, Urban Soil Management, GCREC, Wimauma, FL.
Co-principle Investigator: Patrick Minogue Weed Management and Forest Physiology, NFREC, Quincy, FL.

(Submitted as partial fulfillment of Florida Department of Transportation Contract UF00093188)



Future?

- Very promising!
- Success can come from personal efforts and collective sharing of experiences
- **Step by Step,
Yard by Yard!**





Appearance?:
City of Tallahassee









Orlando





Questions?



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