MEDICINAL & BEVERAGE CROPS PROGRAM

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Program Overview

- Florida is the 2nd largest producer of horticultural products
  - > $16 billion in sales and services
  - > 240,000 individuals employed
  - Between 2005 and 2010, approximately 88,500 jobs lost in this sector

- 1 out of every 3 Americans consume or use natural health products
- Alternative medical market = $9 billion annually
  - > $3 billion in sales of medicinal herbs
- Product consistency is key = outstanding management

Skullcap (*Scutellaria* spp.)

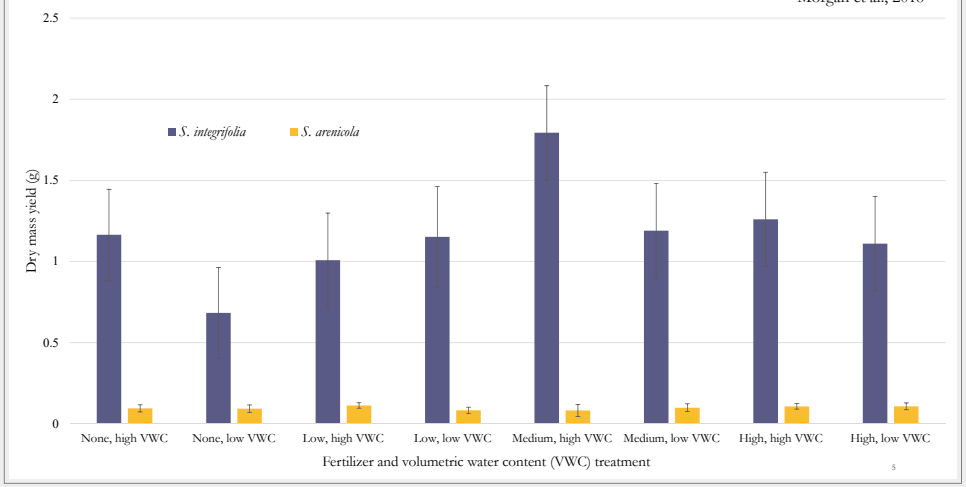
S. baicalensis

- Approximately 350 species
  - FL: 13 species identified / 11 native species
  - Baicalin = main flavonoid in skullcap; anxiolytic and anti-inflammatory (Li et al., 2000)
- *S. baicalensis* historically used as a source of medicine in China, Japan, and Korea
- In U.S., *S. lateriflora* dominates the medicinal marketplace for treatment of anxiety
  - Popular alternative to kava and valerian root
  - Skullcap is sold on dry weight basis and not on concentration of active compounds

Skullcap (*Scutellaria* spp.)

- Can commercial production conditions be developed to consistently produce quality skullcap?
  - Quality = visual and consumptive
  - Can production conditions be modified to enhance concentrations of baicalin?
- Water stress and nutrient deficiencies have been correlated with flavonoid accumulation in plant species (Coronado et al., 2005)

- **Experiment:**
- 2 Species
  - *S. integrifolia* & *S. arenicola*
- 4 Fertility treatments
  - 0 g (control), 3.8 g (low), 9.2 g (medium), 13.8 g (high) Osmocote 15-9-12 slow release
- 2 Volumetric water content (VWC) rates
  - 56% & 10%



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Baicalin concentrations of *Scutellaria integrifolia*, *S. arenicola*, and *S. lateriflora*. Baicalin yield based upon mean dry mass yield (DMY) of harvested plants.

Species	Available Water[z]	Fertilizer Rate[y]	mg baicalin/g dried plant material	Baicalin yield (mg) based on DMY
S. integrifolia	High VWC	None	0.870 bc	1.0
		Low	1.294 ab	1.3
		Medium	1.211 ab	2.2
		High	0.273 c	0.3
	Low VWC	None	1.383 ab	0.9
		Low	1.093 ab	1.3
		Medium	1.522 a	1.8
		High	0.801 bc	0.9
S. integrifolia	Field harvested	--	1.457	--
S. arenicola	High VWC	None	1.996	0.2
		Low	1.877	0.2
		Medium	2.159	0.2
		High	1.470	0.2
	Low VWC	None	1.861	0.2
		Low	2.065	0.2
		Medium	2.281	0.2
		High	2.899	0.3
S. arenicola	Field harvested	--	2.348	--
S. lateriflora	Store-bought	--	0.274	--

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Butterfly pea (*Clitoria ternatea*)

- Unique perennial, leguminous plant that produces brightly colored flowers that can be used in culinary preparations
- pH dependent natural food colorant
  - Anthocyanins present are primarily associated with antioxidant properties
  - Traditionally used in preparation of Malay rice dish
  - Modern interest in color changing adult beverages

Butterfly pea (*Clitoria ternatea*)

- Can commercial production conditions be developed to consistently produce quality butterfly pea flowers?
  - Quality = visual and consumptive
  - Can production conditions be modified to enhance concentrations of anthocyanins?
- **Experiments:**
  - Temperature and media on germination
  - VWC and nutrient application rate on growth, yield, and anthocyanin conc.
  - Nondestructive plant nutrient status determination

Key Points

EDIS #ENH1309 (Butterfly pea)
EDIS #ENH1300 (Skullcap)
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- **Research Next Steps**
  - Skullcap = Evaluate species that have not been examined for presence and synthesis of baicalin; medical efficacy of baicalin and other flavonoids as natural plant product medicines
  - Butterfly pea = Utilize freshly harvested flowers in production of beverages; evaluate a larger range of cultivars for their visual landscape appeal and anthocyanin production
- **Extension Next Steps**
  - Develop and organize annual Extension IST focused on medicinal and beverage crops
  - Provide agents with information and communication media to help engage with stakeholders
- **Integration of Research & Extension**
  - Seek and secure funding to explore commercial production of medicinal and beverage specialty crops (SARE)
  - Regional Specialized Agents (RSAs)