

UF IFAS UNIVERSITY OF FLORIDA

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## ECOSYSTEM SERVICES OF OVERSEEDING AESCHYNOMENE INTO BAHIAGRASS PASTURES IN FLORIDA

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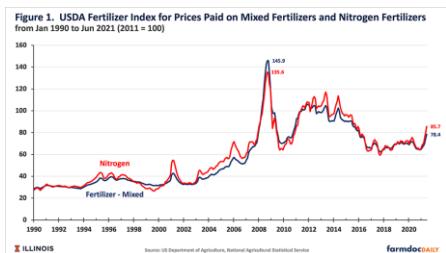


Figure 1. USDA Fertilizer Index for Prices Paid on Mixed Fertilizers and Nitrogen Fertilizers from Jan 1990 to Jun 2021 (2011 = 100)

Sources: US Department of Agriculture, National Agricultural Statistical Service

farmdocDAILY

Schnitkey, G., N. Paulson, C. Zulauf and K. Swanson. 2021 Fertilizer price increases in perspective, with implications for 2022 costs. *farmdocdaily* (11):114. Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign.

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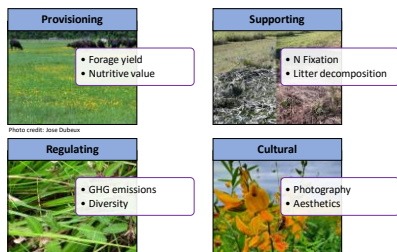
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### ECOSYSTEM SERVICES FOR LEGUME INCLUSION ON PASTURES



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**AESCHYNOMENE**

*Aeschynomene americana* L., also known as joint vetch, deer vetch, or shyleaf.

Annual, warm-season legume. Native from southern United States.

It prefers humid, light acidic to neutral soils (pH 5.5 – 7)



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Previous studies have determined aeschynomene characteristics and performance:

	Only aeschynomene	Aeschynomene + Limpograss	Aeschynomene + Bahiagrass	Notes
References	Mislevy et al. 1981	Sollenberger et al. 1987	Kalmbacher et al. 1983	
Forage accumulation (ton/ha/year)	2.1 – 2.6	5.6	4.3	
Crude protein (%)	15 – 20	8	9.6	4% limpograss; 7% bahiagrass
Digestibility (%)	60 – 64	58	46.4	61% limpograss; 41% bahiagrass

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**Objective**

To quantify the effect of aeschynomene overseeding and N fertilization on forage characteristics, N fixation and nitrous oxide emissions in bahiagrass pastures.



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**Experimental site**

Range Cattle Research and Education Center, Ona FL.



**Experimental period**

April 2019 to October 2021

<https://research.ifas.ufl.edu/research-area/facilities/>

**Soil characteristics**

Soil series	Year	pH	mg/kg				CEC meq/100 g
			P	K	Mg	Ca	
Pomona fine sand	2019-2020	5.0	19	53	287	1811	9.8
	2020-2021	5.4	26	71	317	1566	9.2



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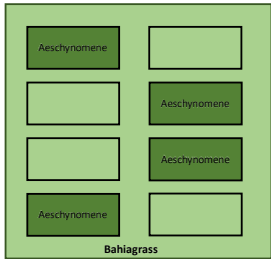
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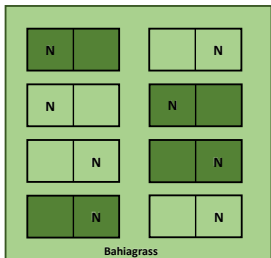
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**Treatments:**

1. Bahiagrass
2. Bahiagrass and N fertilization
3. Bahiagrass + Aeschynomene
4. Bahiagrass + Aeschynomene and N fertilization

**Legume seeding rate:** 10 kg/ha of inoculated seed.

**Fertilization:**

- 1 ton lime/ha before plots preparation
- 13.2 and 25 kg/ha of P and K
- **Treatment:** 60 kg N/ha

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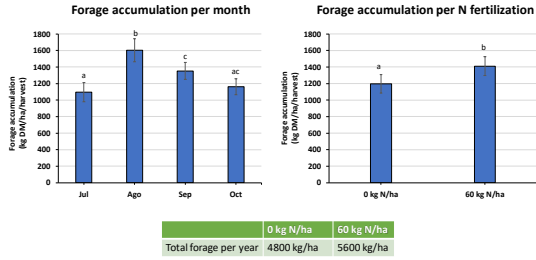
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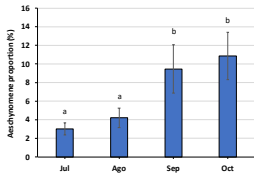
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**FORAGE ACCUMULATION**

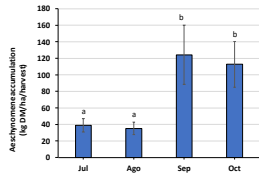


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**Aeschynomene proportion into bahiagrass plots**



**Aeschynomene accumulation into bahiagrass plots**

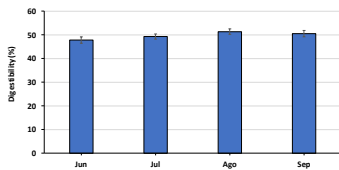


Aeschynomene produced 311 kg DM/ha/year, regardless the N fertilization.

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**NUTRITIVE VALUE**

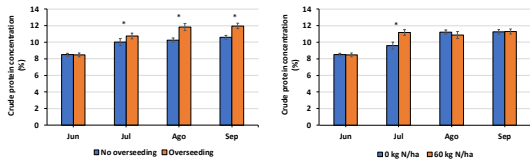
**In-vitro digestibility on aeschynomene-bahiagrass plots**



Plots maintained 47 – 50% digestibility, regardless any treatment.

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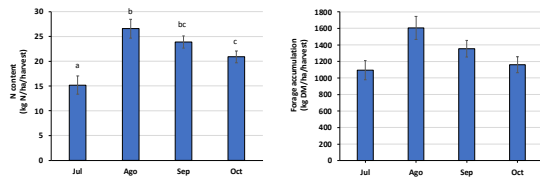
Overseeding aeschynomene and N fertilization on crude protein concentration in bahiagrass plots



Aeschynomene maintained 21% CP concentration, regardless the N fertilization.

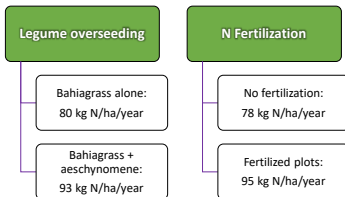
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Nitrogen content in bahiagrass – aeschynomene plots



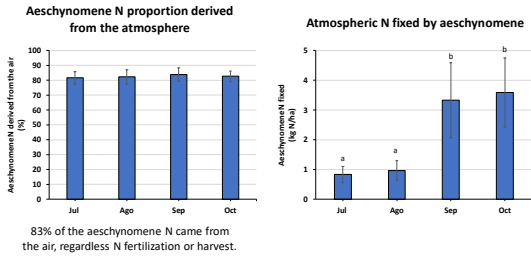
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Accumulated N content in bahiagrass – aeschynomene plots



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**N FIXATION**



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Bahiagrass also fixed atmospheric N:

- 62% of bahiagrass N came from the atmosphere.
- Bahiagrass fixed 50 kg N/ha/year.



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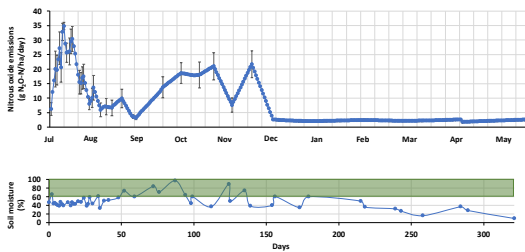
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**NITROUS OXIDE EMISSIONS**



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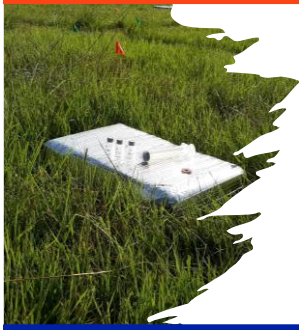
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**Accumulated N<sub>2</sub>O emissions in bahiagrass – aescynomene plots**

**Legume overseeding**

- **Bahiagrass alone:**  
2.2 kg N<sub>2</sub>O-N/ha/year
- **Bahiagrass + aescynomene:**  
2.8 kg N<sub>2</sub>O-N/ha/year

**N Fertilization**

- **No fertilization:**  
2.2 kg N<sub>2</sub>O-N/ha/year
- **Fertilized plots:**  
2.7 kg N<sub>2</sub>O-N/ha/year

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**CONCLUSIONS**

- Overseeding aescynomene into bahiagrass increased crude protein concentration of the pasture, causing no differences in forage yield.
- Aescynomene was effective to fix biological N and the magnitude of the fixation was driven by herbage accumulation.
- Overseeding aescynomene increased the same amount of N<sub>2</sub>O/year than N fertilization into bahiagrass pastures.

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*Thank you...*



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